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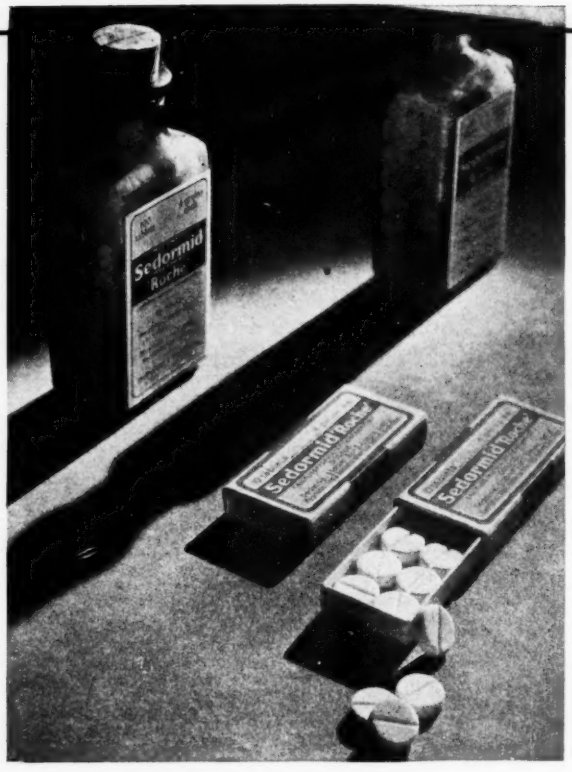

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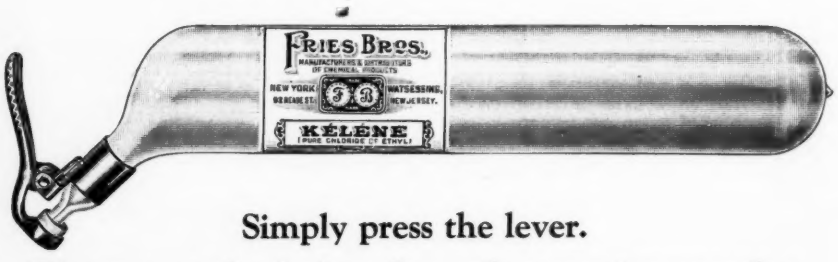

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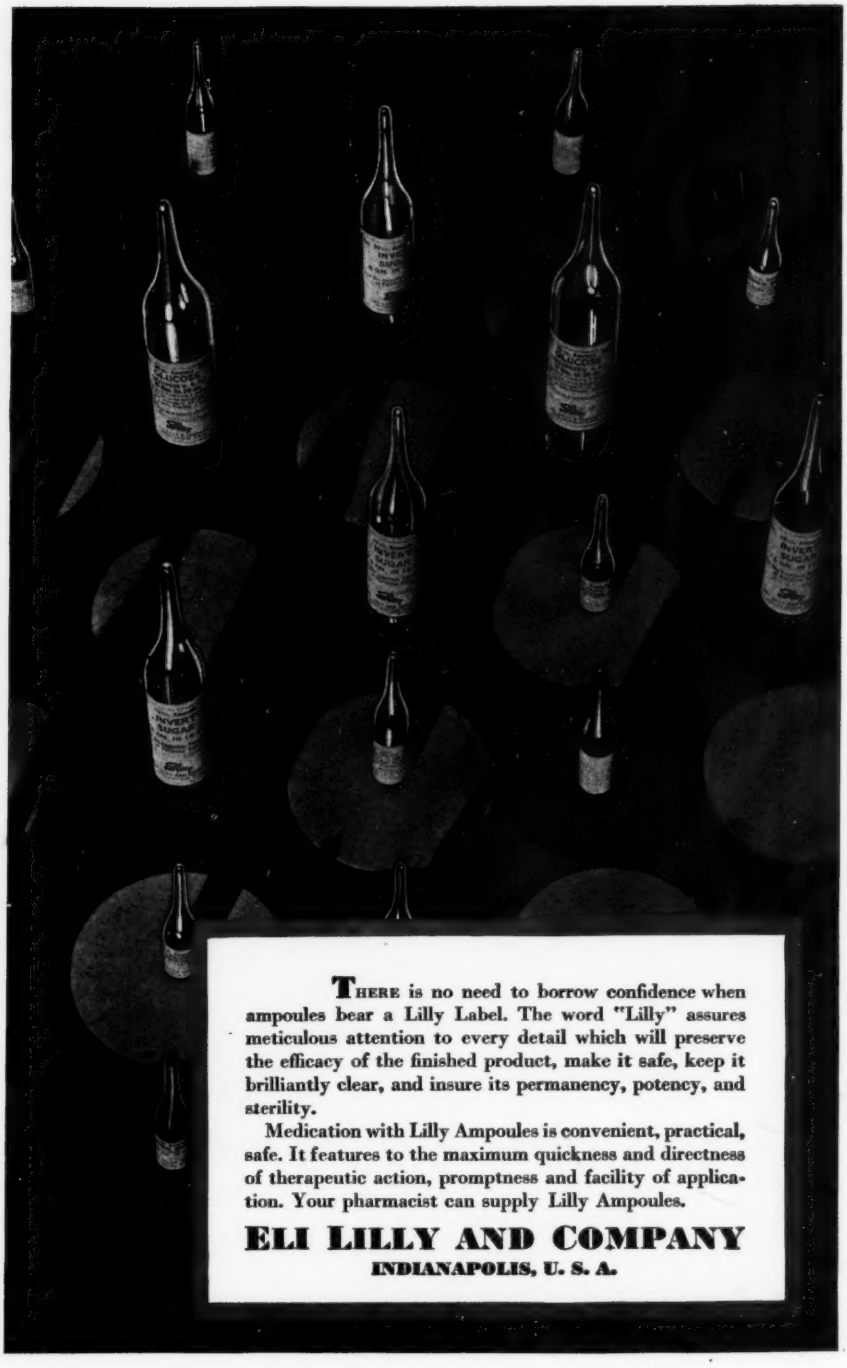
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*King, J. Cash, and Cocke, Edwin W.: Therapeutic Fever Produced by Diathermy, with Special Reference to its Application in the Treatment of Paresis. South. Med. Jour., Mar., 1930.

See also Illinois M. J., LVI:3:203, Sept., 1929, "Artificial Fever Produced by High Frequency Currents—Preliminary Report." By Clarence A. Neyman, A.B., M.D., and S. L. Osborne, B.B.E.

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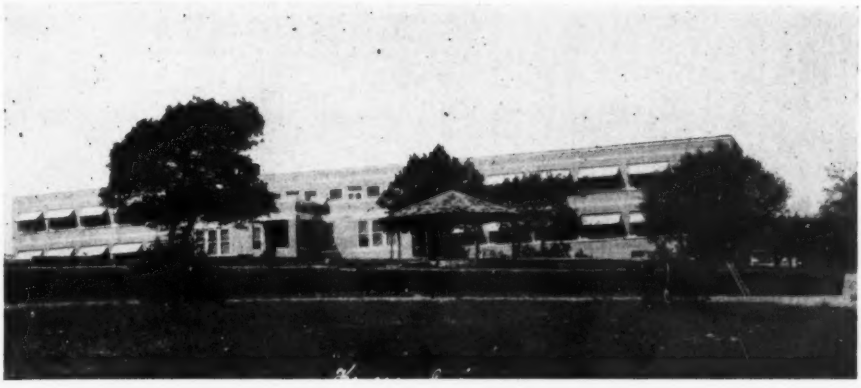

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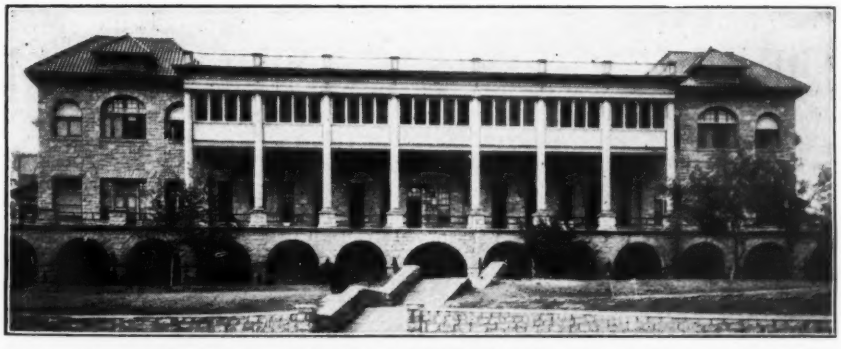

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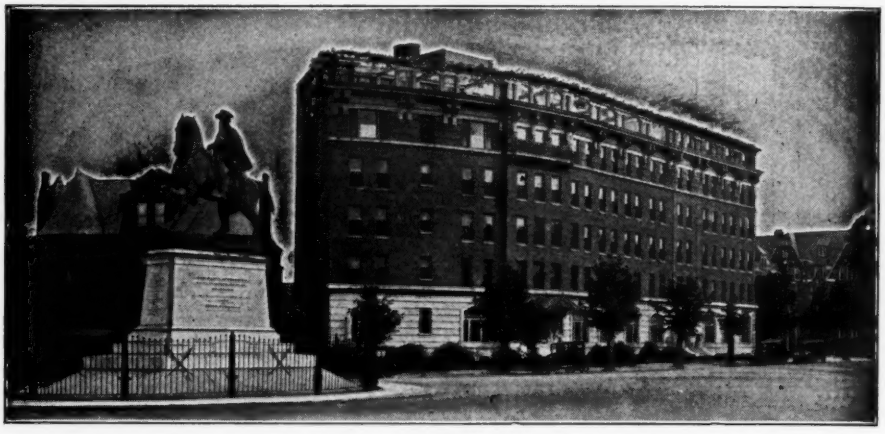

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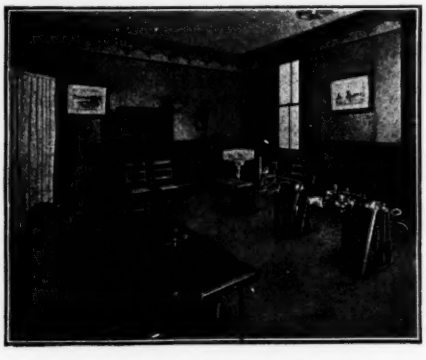

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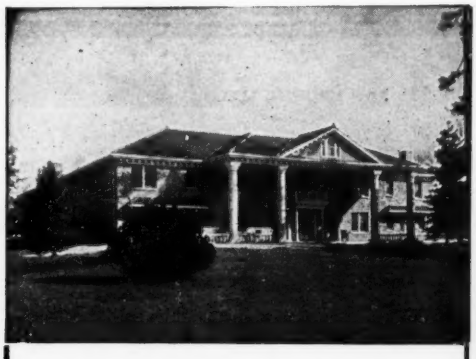

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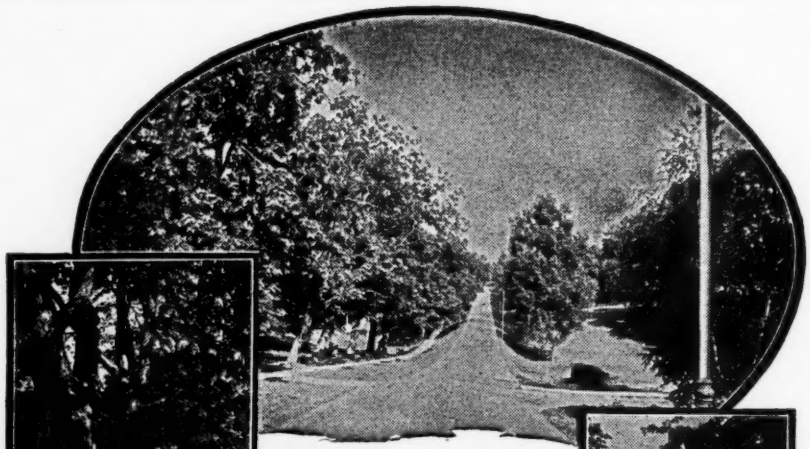

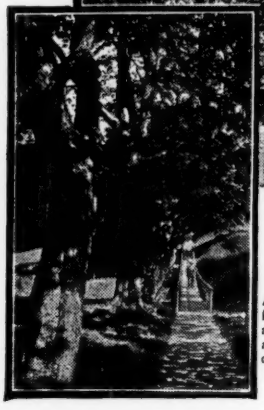

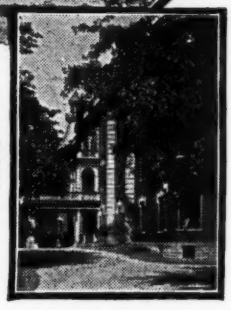

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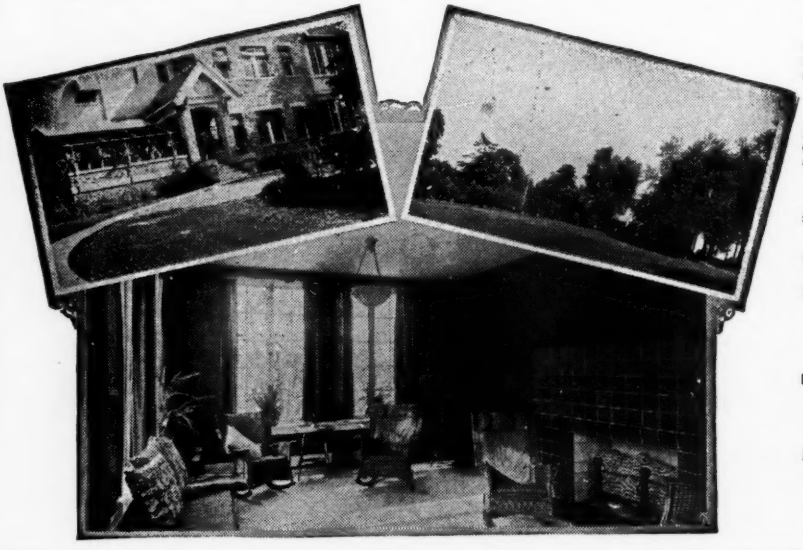

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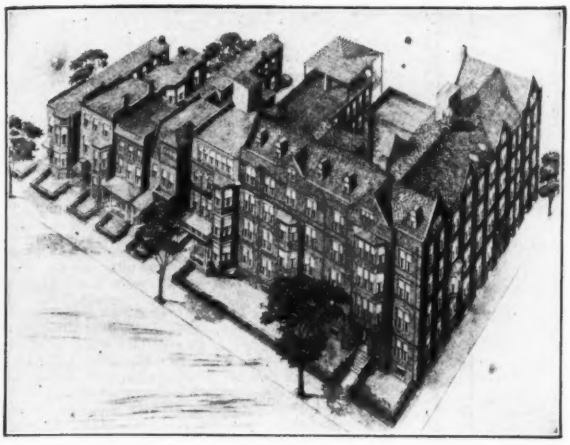

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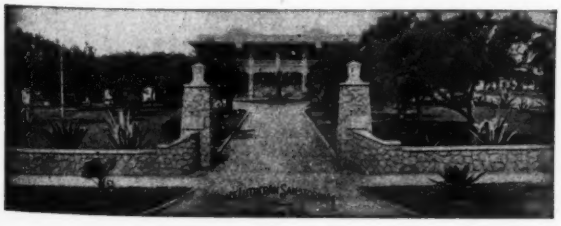

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A STUDY OF INFANT MORTALITY IN THE SOUTHERN STATES*

By BAIRD U. BROOKS, M.D.,
Durham, N. C.

The purpose of this paper is to make a study of infant mortality in some of the Southern states. The following states have been chosen, namely: Virginia, North Carolina, South Carolina, Georgia, Mississippi, Louisiana, Alabama, Florida. The study is based upon the number of deaths per one thousand live births and does not include still births.

Forty-four states were in the birth registration area in 1928, and numbered according to their rank in the infant mortality rate we find the Southern states mentioned above in the following rank:

Florida, 23, with an infant mortality rate of 67.2; Mississippi, 33, I. M. R., 74; Alabama, 34, I. M. R., 75; Virginia, 35, I. M. R., 75.9; Louisiana, 37, I. M. R., 78.4; Georgia, 40, I. M. R., 81.6; North Carolina, 41, I. M. R., 85.8; South Carolina, 43, I. M. R., 96.5.[1] The average rate for the birth registration area for 1928 was 67.7. Only one of the Southern states, namely, Florida, with the rate of 67.2, was better than the average (*Chart 1*).

A study of the urban mortality in the United States, using 719 cities of the country, will show a more striking picture. The rank here will be as follows:

Florida, 16, I. M. R., 65; Louisiana, 34, I. M. R., 83; Mississippi, 36, I. M. R., 87; Virginia, 37, I. M. R., 91; Alabama, 38, I. M. R., 96; Georgia, 40, I. M. R., 99; North Carolina, 41, I. M. R., 109; South Carolina, 42, I. M. R., 117. The average rate for the 719 cities is 68.3.[2] Only Florida is better than the average (*Chart 2*).

A further study of this condition over a period of the past five years shows very little change in the relative positions of these states. In 1924, of 32 states in the registration area, the Southern states had the following relative rank, namely:

Chart 1
Infant mortality rate for the birth registration area in 1928, compared with infant mortality rate in the Southern states.

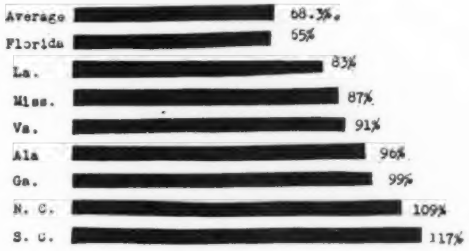

Chart 2
Infant mortality rate in 1928, based on a study of urban mortality, using 719 cities in United States.

Mississippi, 22, I. M. R., 71.3; Virginia, 24, I. M. R., 77.6; Florida, 29, I. M. R., 81.8; North Carolina, 30, I. M. R., 82.3. The average for the registration area, including 32 states, was 70[3] (*Chart 3*).

In 1925, 33 states were in the registration area and the Southern states ranked as follows:

Mississippi, 12, I. M. R., 68.5; Florida, 24, I. M. R., 74.2; North Carolina, 28, I. M. R., 78.8; Virginia, 30, I. M. R., 80.8. The average for the 33 states was 71.7[4] (*Chart 4*).

In 1926, with 36 states reporting and an average of 73.3, for the birth registration area, the rank was as follows:

Mississippi, 12, I. M. R., 70; Florida, 19, I. M. R., 74.8; North Carolina, 30, I. M. R., 82.3; Virginia, 32, I. M. R., 83.7[5] (*Chart 5*).

*Read in Section on Pediatrics, Southern Medical Association, Twenty-Third Annual Meeting, Miami, Florida, November 19-22, 1929.

In 1927, with 40 states reporting, and an average of 64.6, the rank was as follows:

Alabama, 21, I. M. R., 64.4; Mississippi, 25, I. M. R., 66.8; Florida, 26, I. M. R., 67.4; Virginia, 35, I. M. R., 75.5; Louisiana, 36, I. M. R., 77; North Carolina, 37, I. M. R., 79.1[6] (*Chart 6*).

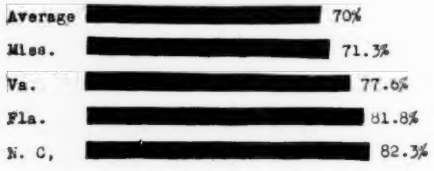

Chart 3
Infant mortality rate in 1924. Thirty-two states in registration area.

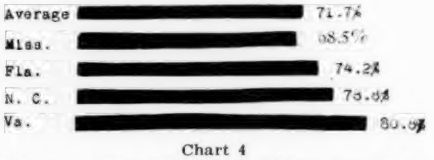

Chart 4
Infant mortality rate in 1925. Thirty-three states in registration area.

Chart 5
Infant mortality rate in 1926. Thirty-six states in registration area.

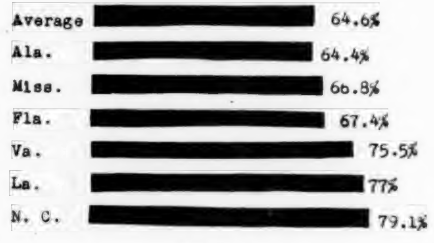

Chart 6
Infant mortality rate in 1927. Forty states in registration area.

The average annual decline in the infant mortality rate for the birth registration area during the five year period, 1924 to 1928, has been 0.4. The four Southern states reporting for the full five years show an average annual decline as follows:

North Carolina, 0.64; Florida, 7.72; Mississippi, 1.12; Virginia, 1.1.

If we make a further comparative study of the cities of the United States, taking four typical cities, New York, Cleveland, St. Louis and Los Angeles, comparing them with an equal number of typical Southern cities, we find even a more striking contrast. The average infant mortality rate for these cities over a period of 13 years is as follows:

New York, 75; Cleveland, 80; St. Louis, 72.5; Los Angeles, 68.8.[7] In Virginia the rate was as follows: Lynchburg, 88.6; Norfolk, 99; Richmond, 107; Portsmouth, 113; Petersburg, 141.7.[8] This covers a 13 year period (*Chart 7*).

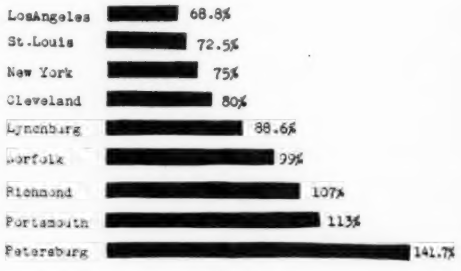

Chart 7
Infant mortality rate in four typical cities of the United States, compared with infant mortality rate in five cities in Virginia. (Thirteen-year period.)

In North Carolina the rate for the 13 year period is as follows: Winston, 134.5; Durham, 132.5; Wilmington, 126; Charlotte, 112.3; Asheville, 118.5; Raleigh, 107.1[9] (*Chart 8*).

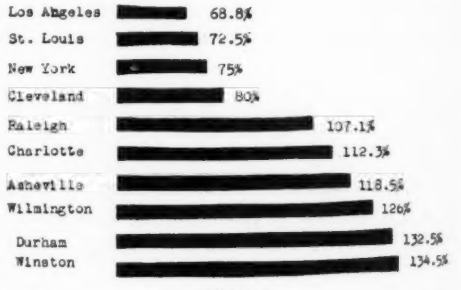

Chart 8
Infant mortality rate in North Carolina. (Thirteen-year period.)

In South Carolina for an eight year period the rate is as follows: Charleston, 139.5; Columbia, 110.9; Spartanburg, 100.4; Greenville, 87.5[10] (*Chart 9*).

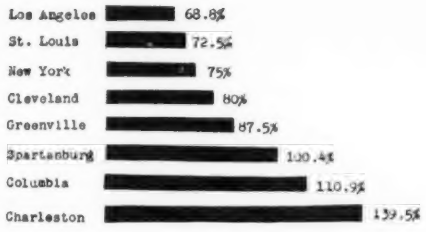

Chart 9
Infant mortality rate in South Carolina. (Eight-year period.)

In Georgia the rate is: Savannah, 115 (8 years); Macon, 104.7 (7 years); Atlanta, 113 (13 years)[11] (*Chart 10*).

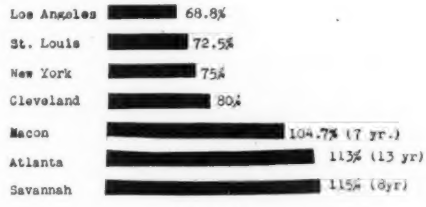

Chart 10
Infant mortality rate in Georgia.

In Alabama the rate is: Montgomery, 102; Birmingham, 101; Mobile, 99 (13 year period)[12] (*Chart 11*).

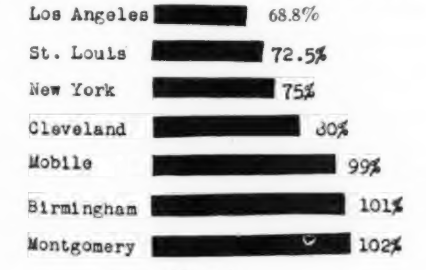

Chart 11
Infant mortality rate in Alabama. (Thirteen-year period.)

In Mississippi the rate is: Jackson, 108; Vicksburg, 99.8; Meridian, 81.6 (8 year period)[13] (*Chart 12*).

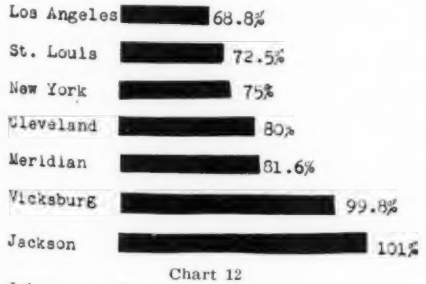

Chart 12
Infant mortality rate in Mississippi. (Eight-year period.)

In Louisiana the rate is: New Orleans, 91.6; Shreveport, 90.8; Baton Rouge, 85 (13 year period)[14] (*Chart 13*).

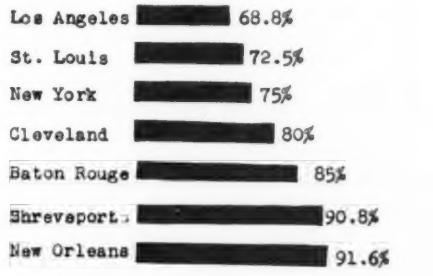

Chart 13
Infant mortality rate in Louisiana. (Thirteen-year period.)

In Florida the rate is: Jacksonville, 89.2; Tampa, 85.7 (13 year period); Miami, 94; Pensacola, 96 (8 year period)[15] (*Chart 14*).

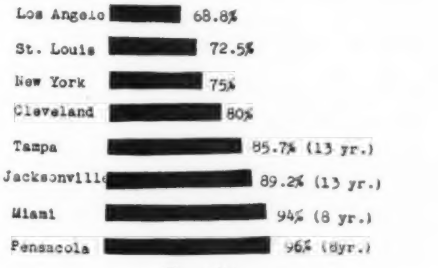

Chart 14
Infant mortality rate in Florida.

It would appear from the facts presented that the mortality rate in the Southern states is not only higher than in other group sections of the United States, but that it is really higher than it should be when all conditions influencing the death rate in infancy are brought into consideration.

There are three factors which largely determine infant mortality. They are, heredity, environment and economic status. Certain races show a greater life expectancy than others, and the negro belongs to the type showing a short expectancy, hence a natural increase of the rate from that source. It is also known that climatic conditions have a great influence in determining the ability of the infant to survive. The large industrial population of the Southern cities, made up chiefly of persons of lowered intelligence and of very poor financial status, is undoubtedly an important factor in the high infant death rate of the Southern states. In many cases it is beyond question true that this element of our population has not sufficient intelligence to

watch over the infant as is necessary, or even when there is sufficient intelligence there is insufficient financial support to permit the acquirement of the best medical advice and supervision. The infant in these conditions is permitted to grow up or to die with only the advice or guidance of some ignorant parent or neighbor, with all the hazards which attended the growth and development of infants a generation ago. The workers are denied the modern knowledge of the proper care of the infant on account of these handicaps.

If we consider the specific causes of infant mortality we will find them grouped in three classes: congenital, gastro-intestinal and infectious. In the congenital class would be included, deaths from prematurity, birth injuries, congenital debility and malformation. This class of patients should be cared for by the obstetrician, and we, as pediatricians, are largely absolved from this responsibility. Gastro-intestinal, respiratory diseases and infections are almost entirely pediatric problems.

A study of the deaths from gastro-intestinal and respiratory diseases will show the greater susceptibility of the negro to these diseases. The deaths among negroes under two years of age from diarrhea and enteritis will show the colored rate per 100,000 population to be approximately 30 per cent higher than the white. The rate from respiratory diseases shows the colored race almost double that of the white, the rate being 22.9 for white and 44.3 for colored.

The problem in the Southern states then becomes very largely one of improving conditions among the colored and the white industrial population. In the final analysis the mortality is one of neither the white nor colored race; but the rate will be lowered by instructing the mother in such a way as to enable her to give her infant the benefit of present day knowledge.

Dr. Richard H. Smith, in a review of the report of the Medical Research Council on Poverty, Nutrition and Growth, undertaken by Dr. D. Noel Paton and Dr. Leonard Findlay, of Scotland, says:

"Heredity, environment and social conditions were studied, and the effect of each was carefully analyzed. When allowance was made for chance, and for the influence of every known factor, the one constant feature which, under all conditions, exerted a controlling influence, was maternal care. Those babies whose mothers were able and willing to exercise intelligent supervision did well in spite of the most unfavorable conditions, while those who were deprived of intelligent care did badly no matter how favorable the other factors might be."[16]

This, to my mind, sums up the most important factor in the control of infant mortality. Intelligent care is essential, whether the mother be rich or poor, ignorant or cultured, white or black.

With these facts in mind, an effort has been made in Durham, North Carolina, a city of approximately 45,000 population, to improve the existing conditions. Our efforts have been directed along the line of well-baby clinics.

Medical service in these clinics is furnished by the local pediatricians at no cost to the city. The nursing service is furnished by the local board of health, and at the present time consists of two full time nurses, one white and one colored. One of these nurses is in attendance at each clinic and in the interval between the clinics she spends her time in follow-up work, visiting the homes and giving needful instructions to the mother in the care of her infant.

There are five clinics in all, three white and two colored. Each of these is located in a strategic point, being placed in the center of industrial areas for the white, and in the center of the negro settlements for the colored. No milk nor baby food of any description is dispensed at the clinics, it being considered more helpful if the mothers are taught the preparation of the food, and are required to prepare it for themselves. The visiting nurse helps by supervising this and by teaching the mothers in their own homes.

The babies are brought back to the clinics for supervision and re-examination at the discretion of the attending physician. If one of the clinic babies becomes ill he is sent to the hospital and placed in the care of the clinic physician. In this manner the service is continuous, whether the baby is well or sick.

The clinics of Durham were opened in 1920. No accurate statistics are available until the year 1924. The last five months of 1924 showed an attendance of 932 at the clinics. In the year 1924, the infant mortality for Durham was, white, 83; colored, 196. In 1925, with an attendance of 2,119, the white mortality was 67.7; colored, 173.5. In 1926, with an attendance of 2,963, the white mortality was 62.5; colored, 162.4. In 1927, with an attendance of 3,125, the white mortality was 52.5; the colored, 141.8. In 1928, with an attendance of 3,380, the white mortality was 56.6; colored, 119.2.[17]

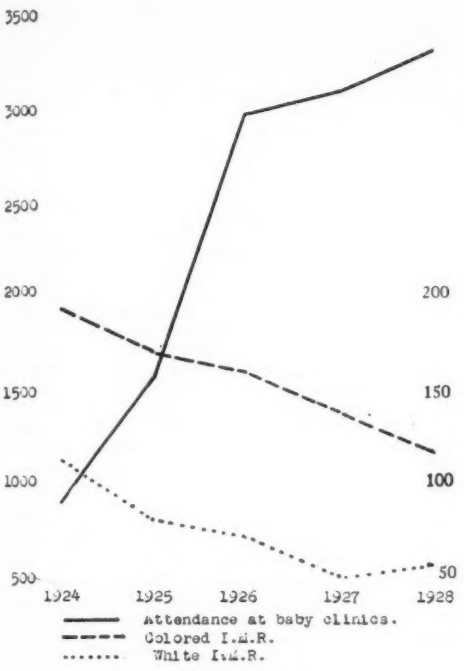

Chart 15

Showing decline of infant mortality rate with increase of attendance at baby clinics.

The chief aim in our clinics has been to teach the mother the intelligent, watchful care of her infant; to teach her to see and to know when the baby is not doing well, and then to guide and direct her in the proper methods in the care of her infant.

We realize that there are many other factors instrumental in the reduction of this high death rate among our babies, but we feel that our clinics have contributed largely in the reduction of this useless waste of life.

SUMMARY

A brief study of the infant mortality in the Southern states is presented.

This study shows, (1) a higher infant mortality rate in the Southern states from 1924 to 1929 than prevails in other states in the Union.

(2) A higher infant mortality rate in the larger cities of each of the Southern states studied than in other cities of the Union selected at random and widely separated.

(3) The factors determining infant mortality rates are presented, and their bearing on conditions in the Southern states is shown.

(4) It is asserted that intelligent care is the chief factor in reducing infant mortality.

(5) A brief study of the work done in the well-baby clinics of Durham, North Carolina, is presented, showing a resulting decline in the infant mortality rate in that city since the establishment of these clinics.

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DISCUSSION (*Abstract*)

Dr. Edward Clay Mitchell, Memphis, Tenn.—That the Southern states should have a higher infant mortality rate than the Northern states is not particularly surprising. Dr. Brooks has mentioned the negro as the chief influencing factor, but it seems to me there are several others worthy of mention. Malaria is certainly responsible for some of our infantile deaths. A mother, whose physical condition has been lowered by malaria, will not prove as efficient as a well mother. Prenatal care is prominent by its absence in many of the Southern territories and there are infinitely more midwives in the South than in the North. The long season of hot weather lowers the resistance of small infants. Many communities do not have ice, and still more could not purchase ice were it available. Sanitary conditions are frequently deplorable. Dysenteries of different types are responsible for numbers of infantile deaths each year. It would seem, therefore, that the negro population, the prevalence of malaria, dysenteries, and midwives, together with the lack of sanitation, especially during the summer months, all are jointly responsible for the increased infant mortality of the South.

The statement that the states selected for study have not changed their relative positions in the past five years is certainly one which demands consideration.

The well-baby clinic, as described by Dr. Brooks, is undoubtedly a step in the right direction. Too many so-called "well-baby clinics" are conducted by boards of health, subject to political jurisdiction, and are "well-baby clinics" in name only. In Memphis, our well-baby clinic is under such supervision, and, while it is accomplishing some good, we are not receiving the maximum benefit for our efforts. The best results are

obtained when these clinics are under the supervision of a group of physicians, or a university maintaining a constant staff. The university presents the teaching attitude and the attitude of preventive medicine unhampered by political maneuverings.

Certain rural districts of Mississippi are undertaking a survey regarding the etiology and prevention of malaria and infantile diarrhea. Trained workers are employed and this work is being adequately supervised and directed. A study of this community in four or five years should yield excellent material for comparison with our present unsatisfactory methods.

Another example of an efficient organization is that which New Orleans has had for the past few years. Prenatal care is emphasized and the follow-up work is frequent and thorough.

Dr. Wilburt C. Davison, Durham, N. C.—I do not think most persons are familiar with the high infant mortality in the Southern states, and if those of us who have seen these figures will remember them, we shall make progress toward reducing that mortality.

There are only two main causes of infant mortality: one is inadequate prenatal care and accidents during delivery, and the other is ignorance of mothers in caring for their children. We are not talking now about the obstetrical end; those in general practice and the obstetricians will take measures to lessen this problem. Our part is to adopt the measures Dr. Brooks has presented. His modesty forbade his saying that he was the pediatrician who established these infant clinics in Durham. He has reduced the mortality, not by giving milk, not by subsidizing mothers, but by teaching them how to take care of their children. All of us can do that, and it is up to us to go and do likewise.

Dr. Lewis W. Elias, Asheville, N. C.—I have been interested in this subject because of the high infant mortality in North Carolina. Last spring, the statistics then available, gave North Carolina the third highest infant mortality rate in the United States. At that time I wrote to the states over the country that had the lowest mortality, and to those having the highest mortality, asking for their methods of handling the situation and their impression as to which methods gave the most relief.

We speak of the high death rate among the negro race; yet North Carolina, with its one-third negro population, has a higher death rate than Louisiana, with one-half negro population. We also have a better climate than Louisiana and Mississippi, with their miasmic swamps.

Most of the deaths are in the first year. One-third of the infant mortality is in the first week of life. From that it looks as though the emphasis must be placed on prenatal work among the mothers, rather than upon these clinics, which, of course, are of value. But, certainly, in these clinics you do not get the babies in the first month, when one-half the deaths occur. So, in Asheville, we are starting a clinic to educate expectant mothers. We are also running these clinics for the care of the children there, and feel that we have done a great deal of good in that way.

We speak of the long hot summer as playing a part in causing the high infant mortality, yet in North Carolina I feel it must be due to the fact that we are turning into a manufacturing population. In the negro race we have a higher death rate than in the white, but in the first five months it is lower than in the white. The negroes nurse their babies for the first few months, but when the babies get older they go back to work in the fields and in domestic service. In the mountains the death rate is higher in the first week of life. The mothers nurse their babies there, and of course there is a better climate. There are all sorts of things to be considered, as Dr. Brooks says. One of the most important things is to educate the pregnant women, because you have to do one-third of the work before the child is born.

Dr. Horton Casparis, Nashville, Tenn.—The most important preventive measure during the first year of life is the prevention of poor nutrition. Good nutrition includes of course the prevention of the deficiency diseases such as, rickets and scurvy. In other words, if a child whose nutrition is good becomes upset or gets some infection he stands not only a much better chance of not dying, but also he is much better able to throw off his disturbance with no serious damage to himself. Dr. Brooks' report shows what can be accomplished if one works along this line. The nutritional danger period in the young infant's life is in the first two or three weeks after birth. The source of food is the mother and she is, or is not, going to have an adequate amount of food for the infant. If she has not enough food it requires only a short time for the infant to get into a nutritional state from which it is often difficult to extricate him. It is much simpler to keep a child in a good nutritional state than it is to get him back into a good nutritional state when he has once had trouble. During this first two or three weeks there is too often a gap in the child's medical care. He has either left the obstetrician and has not yet gone to the pediatrician, or the obstetrician has seen him normal at birth, but fails to pay much attention to him until something fairly serious happens. I wish to emphasize this because if many of the nutritional difficulties are to be prevented this gap of the first few weeks has got to be bridged over by continuous medical supervision. If the obstetrician is to look after the baby he should remember that this early period is important. If the pediatrician is to look after the baby he should begin his supervision at the very beginning.

Dr. John A. Foote, Washington, D. C.—Dr. Philip van Ingen, of the American Child Health Association, did a splendid work by compiling, for several years, tables of child mortality in advance of the United States census. He classified these statistics by the size of the cities, for the reason that infant mortality is relatively low in sparsley settled communities and in large communities, but in the medium sized communities it is high, because those smaller cities have not grown up to the idea of public health measures or even sanitary engineering, and have not educated mothers to take care of their children. In the larger cities the infant mortality would be enormous if the health authorities did not do something to keep it down, so we have large amounts of money appropriated in those communities for child health education.

I might say, in passing, that it is really unfair to compare some of the small communities, Durham, for example, with larger communities such as New York and St. Louis, because in the larger cities large amounts of money are appropriated for health work. About eight years ago the infant mortality in Brookline, Massachusetts, which is a very intelligent community, was 40; in El Paso, Texas, I think the infant mortality was 240, or something like that, due to the influx of uneducated Mexicans. If you want another example of it, compare the general mortality of the state of Missouri with the

mortality of the city of St. Louis. There you have again an example of the effect on the child mortality of educational work. Community intelligence may well be an index of low infant mortality.

Dr. Adrian Bleyer made a statistical study some years ago on what he called the normal deterioration of the children of the poor. He summarized all the factors and found some children in good condition at the end of a year and others in very bad condition, so he put on a social service study, of housing, over-clothing, ventilation, over-feeding, breast-feeding, and so forth. He came to the conclusion that bad housing and over-clothing, poor ventilation, ignorance, dirt, and these other things did not materially cause deterioration in the health of the child, provided it had breast milk. That, to my mind, is an interesting thing in mortality statistics.

Dr. Brooks (closing).—We feel the greatest work we are doing in the clinic is in making the mother look at her baby to determine his condition. We are after her all the time in that regard; she is constantly watching the baby, of course, to see whether anything is wrong, and so discovers it rather quickly.

UTERINE FIBROIDS: ANALYSIS OF ONE THOUSAND CONSECUTIVE CASES*

By JOSEPH COHEN, M.D.,
New Orleans, La.

This is a preliminary analysis of one thousand consecutive cases filed in the record room of the Charity Hospital of New Orleans, under the heading of fibroids, dating back from July 1, 1929. No attempt was made to single out any one of the several gynecological services.

One hundred and three, or 10.3 per cent, are white patients and eight hundred and ninety-seven, or 89.7 per cent, are colored. The colored outnumber the white patients almost nine to one. Does this mean that fibroids are more common in the negro than in the white in the ratio of nine to one? No! It merely indicates that in this series, the proportion is nine to one, and that our negro Charity Hospital fibroid population is greater than the white, for, thirty years ago in this same hospital the ratio was five to one.

Occupation.—Of the patients, 899 do some form of house work; 46 are cooks, 31 are washwomen, 18 work in the fields, seven are seamstresses, four do factory work, two are hair dressers, one is a manicurist, one a saleslady and one a teacher. Social status or occupation evidently does not influence the incidence.

Marital Status.—Nine hundred and forty-eight are married, 44 are single, and the status of the remaining eight could not be discovered from the history. Therefore, 94.8 per cent are married, 4.4 per cent single, and 0.8 per cent doubtful. Shall we say that fibroids are prone to occur more frequently in married women than in unmarried ones? From the age records it will be seen that the patients fall within the years when they naturally would be married. Rather can we say that fibroids are present in unmarried as well as in married women.

AGE

TABLE A—AGE IN FIVE YEAR PERIODS

Age in Years	Number With Fibroids
16-20	9
20-25	55
25-30	174
30-35	219
35-40	299
40-45	128
45-50	74
50-55	23
55-60	6
62	1
72	1
No record	11

TABLE B—AGE IN TEN YEAR PERIODS

Age in Years	Number With Fibroids
0-10	0
10-20	9
20-30	229
30-40	518
40-50	202
50-60	29
62-72	2
No record	11

The youngest patient is 16 and the oldest 72.

The greatest number occur between thirty and forty, with 95 cases, the highest incidence, at thirty-eight. Seven hundred and fifty-six cases, or 75.6 per cent, of this series occur before the age of forty.

Complaints.—What are the chief complaints as recorded in the histories? Some complained of one of the following, some of two or more: 349 complained of pain in the lower part of the abdomen, 205 of a tumor, 122 of pain in the lower back, 99 of menorrhagia, 88 of leucorrhea, 85 of bleeding, 83 of pain in the stomach, 72 of pain in the right side, 69 of a "knot" in the stomach, 50 of pain in the left side, 44 of dysmenorrhea, 31 of metrorrhagia, 25 of pain in the lower left inguinal region, 16 of severe constipation, 25 of a swelling of the abdomen, 20 of pain in the lower right inguinal region, 7 of frequency of urination, 7 of dysuria, and the balance of thirty other complaints. In 95 his-

*Read in Section on Gynecology, Southern Medical Association, Twenty-Third Annual Meeting, Miami, Florida, November 19-22, 1929.

tories no chief complaints could be found. There are, therefore, 721 complaints of pain, 174 complaints of some menstrual disturbance, 299 of a tumor or swelling in the abdomen, 85 of uterine bleeding and 88 of leucorrhea.

DURATION OF SYMPTOMS

The duration of these complaints varied from two days to 25 years. There are:

Duration	Number With Fibroids
One week or less	23
One week to 1 month	101
2 months	57
3 months	41
3-6 months	89
6-9 months	41
1 year	154
2 years	109
3 years	66
4 years	48
5 years	42
5-10 years	64
10-15 years	14
15-20 years	7
20-25 years	2
No record	142

The duration of the complaints of 506, therefore, was a year or less. Does this mean that in 506 cases, the existing pathological condition was old only one year or less? No! I think it rather means, firstly, that the condition "came to a head," so to speak, during this time and demonstrated itself by the above various symptoms, and, secondly, that patients are paying more attention to these symptoms and coming earlier for medical aid.

AGE OF BEGINNING OF MENSES

No menstrual record was obtained from 116 colored and 24 white patients, or 140 in all.

Age in Years	Colored	White	Total
9	1	....	1
10	7	....	7
11	38	6	44
12	109	13	122
13	212	16	218
14	146	18	164
15	96	8	104
16	48	8	56
17	13	1	14
18	6	....	6
19	4	....	4
20	1	....	1

It will be noticed that colored patients commence to menstruate earlier and later than white patients and that at thirteen and at fourteen are found the greatest number of beginners. Thirty-three of the 860 patients with recorded menstrual histories reached the menopause, or 3.8 per cent, so that 96.2 per cent were still menstruating.

For the balance of their menstrual history the cases were divided from their history and physical examination into two classes:

(a) Those having fibroids without involvement of the adnexa, and

(b) Those with involvement of the adnexa.

MENSES OF PATIENTS WITHOUT AND WITH ADNEXAL INVOLVEMENT

	No. Without Adnexal Involvement	No. With Adnexal Involvement
Regular	171	73
Regular with dysmenorrhea	102	68
Irregular as to time and flow	39	21
Menorrhagia	126	54
Metrorrhagia	24	23
Dysmenorrhea and menorrhagia	38	34
Dysmenorrhea and metrorrhagia	8	4
Menorrhagia and metrorrhagia	47	23
Total	555	305

Of this group 49.5 per cent, or one-half, therefore, menstruated regularly, and of these 18.4 per cent complained of dysmenorrhea. One hundred and twenty-six, or 22.7 per cent, had menorrhagia only, while 211, or 38 per cent, had menorrhagia alone, or with either dysmenorrhea or metrorrhagia. Twenty-four, or 4.3 per cent, had metrorrhagia only, while 79, or 14.2 per cent, had it alone or with either dysmenorrhea or menorrhagia. And 47, or 8.4 per cent, had both metrorrhagia and menorrhagia.

Therefore, in spite of the adnexal involvement, 47.8 per cent menstruated regularly, and of this number 22.3 per cent suffered with varying degrees of dysmenorrhea. Fifty-four, or 17.7 per cent, had menorrhagia only, while 111, or 36.4 per cent, had it alone or with metrorrhagia or dysmenorrhea. Twenty-three, or 7.5 per cent, had metrorrhagia only, while 50, or 16.3 per cent, had it alone or with dysmenorrhea or menorrhagia, and 23, or 7.5 per cent, complained of metrorrhagia and menorrhagia only.

For the entire series, therefore, including both groups, 28.3 per cent menstruated regularly without any other menstrual complaint, and 20.3 per cent menstruated regularly, but had some form of dysmenorrhea, making a total of 48.6 per cent, or almost half of the cases who menstruated regularly.

Incidentally, one of these colored patients who was 43 years old, married at 14 and be-

came pregnant with her only child before she ever commenced to menstruate.

Children.—Of the patients, 948 are married. No record regarding children could be obtained from 144 cases, leaving a balance of 804.

FERTILITY

No live children	
Never pregnant	282
One miscarriage	45
Two miscarriages	15
Three miscarriages	17
More than three	5
One or more still births	7
Total	371

A total of 371, or 46.1 per cent, without any children, of whom 35 per cent never were pregnant and 11 per cent were pregnant but did not have a living child.

Living Children.—One hundred forty-four, or 17.9 per cent, had one child and no miscarriages, while 66, or 8.2 per cent, had one child and one or more miscarriages, some having as many as nine, making a total of 26 per cent with only one child.

LIVING CHILDREN

Two children	31
Three children	74
Four children	17
Five children	5
Six children	2
Seven children	2
Ten or more	5

Seventy-six had more than one child and one or more miscarriages, while 11 had more than one child with one or more still births, in three instances four each.

Were these sterile women married long enough, may be asked. The answer is, yes. Only six were married less than two years. The others had been married from two to thirty years.

Some of these were married more than one time. Of those with one child, 15 were married from 3 to 10 years, 49 from 11 to 20 years, and 28 from 21 to 31 years.

Why did the above have either no children or only one child? Is the fibroid responsible for their sterility or para one lives? If so, how is it responsible? By mechanical interference? Yes, in some instances, either by pressure on the adnexa, interfering thereby with function, or by obliterating either the uterine cavity or cervical canal. Does the fibroid give off a secretion or hormone that is responsible? Perhaps! And yet, how about the patients with the fibroids who have several children? It may be that the fibroid has active periods and quiet ones, and that during these active periods some inactivating substance is produced which inactivates the reproductive cycle of the patient, keeping her sterile, and that during the passive periods when the inactivating substance is not produced the reproductive cycle becomes active again and the patient becomes pregnant.

Wassermann Reactions.—No record was obtained in 139 cases. Of the remaining 861 cases, 685 are negative and 176, or 20.4 per cent, positive, ranging from a plus one to a plus four.

SYPHILIS AND FERTILITY

(A)

	Number	No. Wass.	Neg.	Pos.	Per Cent Positive
Sterile	282	18	207	57	21.5
One child	144	8	106	30	21.3
2 children	31	3	22	6	21.4
3 children	74	4	58	12	15.6
4 children	17	1	12	4	25.0
5 children	5	0	3	2	40.0
6 children	2	0	2	0	.....
7 children	2	0	2	0	.....
10 or more	5	0	5	0	.....

This shows, firstly, that women with fibroids can bear successfully one or more children; and, secondly, that women with fibroids and with syphilis, can have one or more children.

Of those having two or more children we have 136, of whom eight had no Wassermann test made, 104 were negative and 24, or 18.7 per cent, were positive. Including the 144 who had only one child, we have 280, of whom 16 had no Wassermann, 210 were negative and 54, or 20.4 per cent, were positive. This last percentage incidentally is the same for the ratio between the negative and positive Wassermanns of the entire series.

MISCARRIAGES AND STILL BIRTHS

CHILDLESS CASES

(B)

	Number	No. Wass.	Neg.	Pos.	Per Cent Positive
1 miscarriage	45	5	33	7	17.5
2 miscarriages	15	0	11	4	26.6
3 miscarriages	17	1	15	1	6.2
More than three	5	0	3	2	40.0
Total	82	6	62	14	18.4

LIVING CHILD PLUS ONE OR MORE MISCARRIAGES

(C)

Children	Number	No. Wass.	Neg.	Pos.	Per Cent Positive
(1) 1 child	66	3	46	17	26.9
(2) 2 or more	76	15	52	9	14.7
Total	142	18	98	26	20.9
(3) No children but one or more still births	7	0	6	1	14.2
(4) One or more living children, plus one or more still births	11	3	5	3	37.5
Total	18	3	11	4	26.6

NOTE: In 1 and 2 some had as many as nine miscarriages and in 3, one had four still births, while in 4 two had four still births each.

SUMMARY

	Per Cent With Positive Wassermann
Absolutely sterile cases	21.5
Childless and miscarriage group	18.4
Childbearing without miscarriages	20.4
Childbearing plus miscarriage	20.9
Childless plus still birth	14.2
Childbearing plus still birth	37.3

It is evident that 20.4 per cent, or one-fifth of all the cases in which a Wassermann test was made, were positive and that the positive Wassermann reactions in this series do not affect the possibility of conception.

Previous Operations.—Fifty-three patients, or 5.3 per cent, had laparotomies performed on them previously. There may have been more, but no record was present on their histories. The exact number of years ago that they were operated upon before coming to the hospital not being ascertained in each case, no definite conclusion can be drawn. But the question arises, especially since there are 506 cases whose symptoms dated back a year or less, did these 53 patients have fibroids at the time of their previous operations? If we could answer this in an affirmative manner then there would be definite evidence that the growths are more than one year old, and the inference previously drawn that the disease, in a good portion of these 506 cases, merely became more insistent in its demands for recognition by the patient in that short space of time would have positive support; for the growths ranged in size from a pea to a watermelon.

Diagnosis.—The cases are grouped according to the diagnosis made from their histories and physical examinations prior to any operative procedure.

There are 547 cases, or 54.7 per cent, with fibroids only; 343, or 34.3 per cent, have fibroids with the adnexa involved, of whom 29, or 2.9 per cent, had in addition one or more medical complications. There are 60 cases, or 6 per cent, with fibroids only, but with one or more medical complications; 18 cases, or 1.8 per cent, of fibroids with secondary anemia; five cases, or 0.5 per cent, of fibroids with intestinal obstruction, and seven cases, or 0.7 per cent, of fibroids with an intra-uterine pregnancy.

In the group of fibroids with adnexal involvement are included all the cases with a tubal or ovarian disease, either unilateral or bilateral. The medical cases include a range of complications such as myocarditis, valvular disease, aortitis, asthma, bronchitis, syphilis of the lung, pulmonary tuberculosis, aneurysm of the arch of the aorta, pyelitis, cystitis, and so forth, while the surgical cases include different types of hernia, cholelithiasis, vesical calculi, hemorrhoids, fibro-adenoma of the left breast, and so forth. The 2 per cent of secondary anemia and the 0.5 per cent of intestinal obstruction can prove to be a very serious menace as will be seen later.

Operation.—Six hundred and ninety-five patients were operated upon and 305 were not. Why were these not operated upon? One hundred and fifteen cases deserted; 58 were sent home to rest, "cool off" and build up; 52 with positive Wassermanns were sent to the clinic for antiluetic treatment first; 24 were sent home to return later because the wards were overcrowded; 13, of whom five had cardiac decompensation, were given radium; nine refused operation, one even after the anesthetic was started; five had influenza; four were to be watched for pregnancy; four died before an operation could be performed; two had severe nephritis; one developed an acute mastoiditis; one had pulmonary tuberculosis; one could not be benefited by an operation, she being 72 years old and somewhat demented; one had an emergency operation for an acute intestinal obstruction; two were sent home to return after the influenza epidemic prevalent at the time was over, and ten had no recorded reasons on their charts.

Of those operated upon, 25, or 3.6 per cent, had a total abdominal pan-hysterectomy; 6, or

0.9 per cent, a hysterectomy with the removal of some of the adnexa, and 3, or 0.45 per cent, a total vaginal hysterectomy, making a total of 34, or 4.9 per cent, who had the entire uterus removed; 401, or 57.6 per cent, had a supravaginal pan-hysterectomy and 200 had a supravaginal hysterectomy with the removal of some of the adnexa, making a total of 601, or 86.4 per cent, with the supravaginal portion of the uterus removed. In addition, both tubes and ovaries were removed in five cases, both tubes in 78 cases, both ovaries in 16 cases, the left tube in 37, the right tube in 42, the right ovary in 65, and left ovary in 71. From the statistical standpoint it will be seen that the left tube is involved almost as frequently as the right, the difference being only five, and the right ovary as frequently as the left, the difference being only six. The difference between the 78 bilateral salpingectomies and the 16 bilateral oophorectomies can be explained by the fact that we are more conservative and less prone to do a bilateral oophorectomy than a bilateral salpingectomy.

We might deduce that the tubes are more frequently involved. If we grant this, then how can we explain the fact that the 37 left and 42 right tubes, or a total of 79 single tubes, were removed as against 71 left and 65 right ovaries, or a total of 136 single ovaries? The total number of tubes though, which is 235, removed singly or bilaterally without the ovaries is greater by 67 than the number of ovaries, which is 168, removed singly or bilaterally without the tubes.

Appendectomy was performed in 431 cases and myomectomies, two of which were vaginal ones, were done in 25, or 3.6 per cent, of cases. Other procedures were carried out in addition to the above, such as dilatation and curettage in 19 cases, perineorrhaphy in ten; hernioplasty in five, cauterization of the cervix in eight, excision of a cervical polypus in eight, some form of suspension in five, trachelorrhaphy in two, amputation of the cervix in one, and so forth.

Anesthesia.—Ether was used in 503 cases, spinal in 136, gas in 21, local in two, and rectal in one. The patients did not influence the selection of the type of anesthesia. The explanation rather lies in the partiality of the services, some preferring spinal, others ether.

Pathological Report.—The pathologist reported on 605 cases of fibromyomata. Some were subserous, or submucous, or intramural or combinations of these. Some in addition had hyalin degeneration, or cystic degeneration or calcification, or abscess formation or necrosis or combinations of these. Some were pedunculated.

The report on the endometrium showed endometritis, either hyperplastic, cystic, chronic, atrophic or combinations of these. There were cases of chronic metritis. There was one case of tuberculous endometritis and one fibromyosarcoma.

The cervices were reported as cervicitis, either chronic, exudative, proliferative, acute, or combinations of these. There were only two cases of cancer, one an epidermoid form, the other a squamous cell form.

The ovaries were reported as oophoritis, either chronic, hemorrhagic, follicular, cystic, serous, fibrous, or combinations of these. There were three dermoid cysts, two terato-blastomata, one cystadenoma, one papillary cystadenoma and one multilocular cystadenoma.

The tubes were reported as salpingitis, either chronic, acute, subacute, fibrous, pseudo-follicular, exudative, proliferative, hyperplastic, suppurative, or combinations of these. Two were reported tuberculous and two were reported negative. It is interesting to note that in 55 the report was acute and chronic salpingitis, in four subacute and chronic, in six acute, and in one acute suppurative salpingitis, showing that in spite of the precautions taken not to operate on "warm cases," some happened to be operated upon before the tubes "cooled off."

Deaths.—There are 38 deaths in this series. Five of these died without an operation and a sixth one had an emergency operation for intestinal obstruction, leaving 32 dead who were operated upon for gynecological condition, giving a mortality of 4.6 per cent. Of the above five cases, one had intestinal obstruction and two secondary anemia. There was a third death from secondary anemia among the cases operated upon, giving a mortality of 7.8 per cent for the secondary anemia deaths and of 5.8 per cent for the two intestinal obstruction deaths. This shows how important a part intestinal obstruction and secondary anemia play when they do occur.

It was noted that 52 cases of syphilis, or 17 per cent, of the total cases not operated upon were sent home for antiluetic treatment first. Some of the services prefer to do this. Did those patients with positive Wassermanns, who were operated upon, fare any worse than those with negative ones? Of the 32 patients operated upon, who died, two had no Wassermann test

made, 25 were negative and 5, or 16.6 per cent, were positive. Since the positive Wassermann percentage for the entire series is 20.4 per cent, it seems apparent that those with positive Wassermann reactions fare no worse than those with negative ones.

PARENTAL BLOOD SERUM IN THE PROPHYLAXIS AND TREATMENT OF MEASLES*

By F. Lee Bivings, M.D.,
and
Roger W. Dickson, M.D.,
Atlanta, Ga.

Degwitz is said to have been the first to report the use of parental serum in the prophylaxis of measles. While there have been numerous papers on the use of convalescent serum, a few of which referred to the theoretical use of serum from parents, there have been very few papers in American literature describing or reporting the use of this valuable and efficient agent in combating measles. Convalescent serum is effective, but, due to the impracticability of securing an adequate supply, its use is very limited.

Table I shows a review of the literature and the results obtained from the use of parental serum by other writers. This very valuable summary is taken from the recent excellent paper by Bader, of New York. It is interesting to note that practically all of the references are of foreign origin.

*Read in Section on Pediatrics, Southern Medical Association, Twenty-Third Annual Meeting, Miami, Florida, November 19-22, 1929.

We have chosen the use of serum instead of whole blood, because the latter is effective in only twice the dosage of the former. Our experience has taught us that comparatively large doses of serum are necessary, and to use twice the amount would be rather strenuous for the patient. The formation of a large discolored area under the skin following the use of whole blood also argues against its use.

It is not within the scope of this paper to take up the work which is being done on the use of animal sera in the treatment and prophylaxis of measles. It is sufficient to say that up to the present time it has not been generally adopted. Since we have an effective weapon in parents' serum for prophylaxis in recent exposures, it would seem that immune animal serum, when perfected, gives greatest promise as a therapeutic agent in selected cases or in active immunization such as it is now used in the prevention of diphtheria.

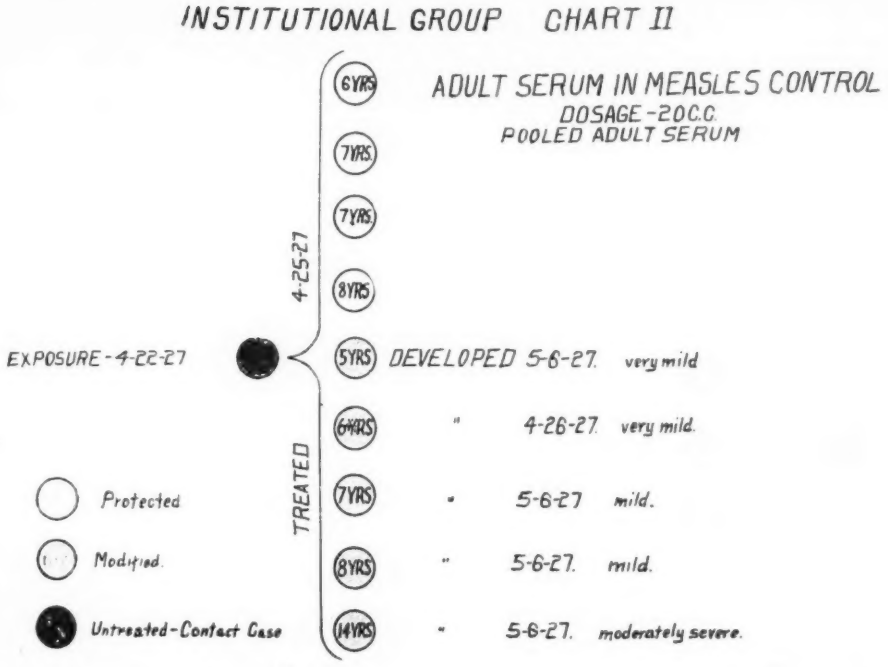
The technic of preparation is so simple as to make its use universal. It consists simply in withdrawing twice the amount of blood as serum is needed from a parent or other suitable donor who has a definite history of having had measles at some previous time. We have found that infiltrating the skin over the vein and using a very large needle prevents premature clotting, and allows sufficient blood to flow out into a sterile container. It is then set aside for from 12 to 24 hours in a cool place. At the end of this time, the serum is easily withdrawn into a large syringe and injected subcutaneously between the scapulae, where there is much loose tissue and little pain or inconvenience to the patient.

As our experience has increased we have found that there are two great factors involved in the

TABLE I

CHART SHOWING A REVIEW OF THE LITERATURE ON THE USE OF ADULT WHOLE BLOOD OR SERUM IN THE PROPHYLAXIS OF MEASLES

Name	Dosage	Results			
		Protected	Modified	Failures	Complications
Degwitz	Said to be the first but no cases are cited.				
Rietchel		2	7	0	0
Van Torday	20 c. c. serum	104	12	0	0
Solomon	10-15 c. c. whole blood	14	38	0	0
Kutter	6-15 c. c. serum	14	1	0	0
Goebel	Whole blood	21	1	0	0
Helsinger	20 c. c. whole blood	10	20	29	1 death
Kovacs		35	4	0	0
Karelitz and Levin		11	3	0	0
Pasini and Casa	30-40 c. c. whole blood	15	17	1	0
Zoepful	Whole blood	5	10	1	0
Bader	20-30 c. c. whole blood	12	18	0	0
Bivings and Dickson		71	32	0	0



results, granting that our donor has had measles: dosage and time of administration. For complete protection, we have found that it is necessary to give a minimum of 0.5 c. c. per pound of body weight, and that it must be given on or before the fourth day after exposure. If more time has elapsed, dosage must be increased.

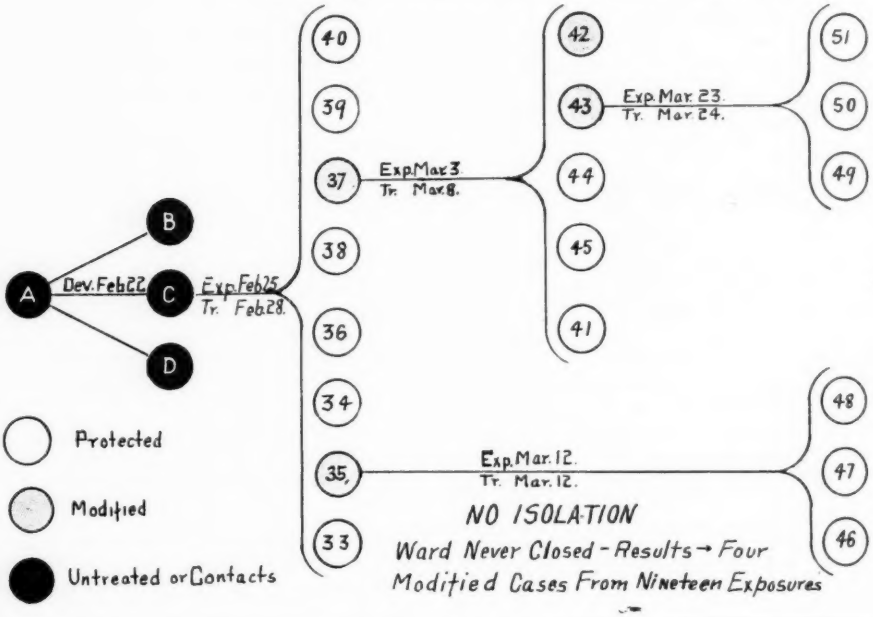
Charts II, III and *IV* show the results obtained in institutions. *Charts III* and *IV* show work done in Grady Hospital, where the appearance of measles has hitherto meant a quarantine of the ward for some time. The first ward epidemic appeared in February, 1928, with the results shown by *Chart III*. In August of the same year, Dr. M. Hines Roberts completely protected 30 exposures by increasing the dosage formerly used (*Chart IV*). A total of forty-nine cases were protected and nine had modified measles.

We are also reporting 43 private cases, including those given us by Dr. Roberts (See *Table II*). It was our purpose in most of these simply to cause the disease to run a milder course. Of these, 25 were completely protected, and 18 had an attenuated form of measles. By attenuation we mean a shorter period of fever, a lessened rise in temperature, a rash varying from a few macules to a scattered rash over the entire body with a much shorter duration of the rash, a mild clinical course, and a complete absence of complications.

In an analysis of the cases we treated, we endeavored to study the relationship of dosage and time of administration. A study of the records reveals that of 78 children given serum during the first four days of exposure, 62 received complete protection, and of the remaining 16 who had modified measles, eleven received less than 0.5 c. c. per pound of body weight. Twenty received serum from five to nine days after exposure and, regardless of dosage, only ten received complete protection, nine of whom were given more than 0.5 c. c. per pound of body weight.

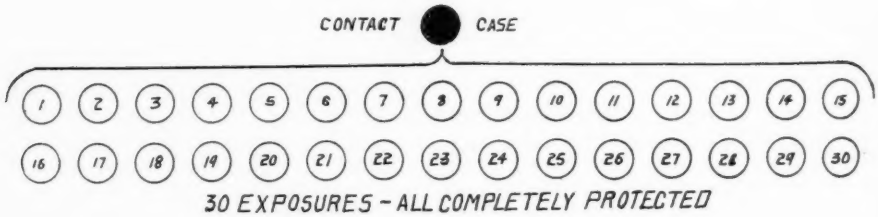
We have never observed a reaction other than local soreness, and we have never observed a complication in a treated case. We believe that in healthy, normal children it is better to produce an attenuation than completely to protect, and we believe that this can best be accomplished by the use of 0.5 c. c. per pound of body weight given after the seventh day of exposure. We made no effort to separate treated patients from exposure. In private cases where a brother

GRADY HOSPITAL GROUP - CHART III
CHILDRENS WARD - COLORED DIVISION
SERUM - From Staff Doctors and Students - Dosage Varied With Age - From 6 to 20 C.C. - Feb. 28 to Apr. 10, 1928



GRADY HOSPITAL GROUP - CHART IV.
CHILDRENS WARD - COLORED DIVISION
SERUM - From Parents Who had had Measles in Childhood.
Dosage ½ C.C. Per Pound of Body Weight

AUG. - 1928



30 EXPOSURES - ALL COMPLETELY PROTECTED

Administered by M. Hines Roberts M.D.
According to Method and Technique Described by Lee Bivings, M.D. and Roger W. Dickson, M.D. - Feb. 1928

TABLE II

PRIVATE GROUP

Case	Weight	Treatment	Result
1	20 pounds	7 c. c. serum, fourth day	Complete protection
2	25 pounds	16 c. c. serum, first day	Complete protection
3	20 pounds	12 c. c. serum, second day	Complete protection
4	35 pounds	25 c. c. serum, fourth day	Complete protection
5	25 pounds	15 c. c. serum, fourth day	Complete protection
6	14 pounds	6 c. c. serum, fourth day	Complete protection
7	23 pounds	8 c. c. serum, third day	Modified measles
8	25 pounds	15 c. c. serum, third day	Complete protection
9	32 pounds	15 c. c. serum, fourth day	Complete protection
10	32 pounds	15 c. c. serum, third day	Complete protection
11	35 pounds	8 c. c. serum, third day	Modified measles
12	35 pounds	15 c. c. serum, third day	Modified measles
13	40 pounds	15 c. c. serum, second day	Modified measles
14	130 pounds	25 c. c. serum, second day	Modified measles
15	33 pounds	13 c. c. serum, third day	Modified measles
16	38 pounds	13 c. c. serum, third day	Modified measles
17	40 pounds	16 c. c. serum, first day	Complete protection
18	33 pounds	25 c. c. serum, second day	Complete protection
19	55 pounds	20 c. c. serum, first day	Complete protection
20	34 pounds	14 c. c. serum, fourth day	Modified measles
21	22 pounds	10 c. c. serum, sixth day	Complete protection
22	40 pounds	16 c. c. serum, fourth day	Complete protection
23	40 pounds	35 c. c. serum, fourth day	Modified measles
24	22 pounds	14 c. c. serum, fourth day	Complete protection
25	37 pounds	18 c. c. serum, fourth day	Complete protection
26	29 pounds	25 c. c. serum, fifth day	Complete protection
27	81 pounds	33 c. c. serum, fifth day	Complete protection
28	40 pounds	24 c. c. serum, fifth day	Complete protection
29	50 pounds	25 c. c. serum, fifth day	Modified measles
30	60 pounds	30 c. c. serum	Modified measles
31	25 pounds	13 c. c. serum, fifth day	Modified measles
32	30 pounds	15 c. c. serum, fifth day	Modified measles
33	45 pounds	20 c. c. serum, fifth day	Modified measles
34	40 pounds	20 c. c. serum, fifth day	Modified measles
35	34 pounds	25 c. c. serum, fifth day	Complete protection
36	59 pounds	30 c. c. serum, sixth day	Modified measles
37	25 pounds	20 c. c. serum, sixth day	Complete protection
38	36 pounds	22 c. c. serum, sixth day	Modified measles
39	15 pounds	10 c. c. serum, sixth day	Complete protection
40	44 pounds	35 c. c. serum, ninth day	Complete protection
41	21 pounds	21 c. c. serum, ninth day	Modified measles
42	48 pounds	40 c. c. serum, third day	Complete protection
43	12 pounds	12 c. c. serum, second day	Complete protection

TABLE III

THERAPEUTIC USE OF SERUM

Case	Weight	Treatment	Result
44	65 pounds	25 c. c. serum, second day of rash	Well in 4 days from onset
45	32 pounds	22 c. c. serum, second day of rash	Well in 3 days from onset
46	50 pounds	25 c. c. serum, first day of rash	Well in 2 days from onset
47	32 pounds	27 c. c. serum, first day of rash	Well in 3 days from onset
48	30 pounds	30 c. c. serum, third day of rash	Well in 5 days from onset
49	48 pounds	35 c. c. serum, day before rash appeared	None

or a sister was the contact case, they often slept together during the entire illness of the contact. Contact cases were efficient control cases, and we did not observe a mild untreated case during the whole series.

We are reporting six cases in which the serum was used as a therapeutic measure in dosage of over 1 c. c. per pound body weight (See *Table III*). Five had modified measles and one was apparently not influenced. We believe that the rationale of this procedure is as valid as the use of convalescent serum in treating infantile paralysis. It must be given in large doses and in the very beginning of the disease in order to have any effect.

SUMMARY AND CONCLUSIONS

Of a total of 103 treated cases, 71 were given complete protection, and 32 developed measles in a modified form.

We believe this method offers a simple and highly efficient means of controlling measles, a disease which should be considered more seriously, especially in young children, or those under par physically. It is apparently free from danger. It is free from reactions, always obtainable, easily given without elaborate laboratory help, and economical to the patient.

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DISCUSSION (*Abstract*)

Dr. A. A. Walker, Birmingham, Ala.—I agree with Dr. Bivings that it is better not to confer on the child complete protection unless there is some special reason, but to modify the disease so that permanent protection is given. No doubt you have all had experience, as I have had, with convalescent serum. But to obtain it so much must be asked of a parent whose child has recently recovered from measles that it is almost impossible to use it except in institutional work.

Dr. Robert A. Strong, New Orleans, La.—It is, of course, impossible to draw any definite conclusions from small groups of cases. Like most infectious diseases, measles varies in the degree of severity in different epidemics. This is due largely to the varying degree of attenuation of the organisms causing a given epidemic. For this reason convalescent serum is equally variable. We have no way of accurately estimating the antibodies present in convalescent serum. The potency of prepared therapeutic sera depends upon the selection of a strain of organisms sufficiently virulent to excite the production of the greatest number of antitoxic units in the animals. Animals are also selected that are capable of reacting, so as to produce a maximum number of antitoxic units. Finally, the antibodies are concentrated from a large bulk of serum into a small amount, which, in turn, is purified in order that the maximum amount of neutralization of toxins may be obtained with a minimum possibility of anaphylaxis.

On the other hand, convalescent sera, derived, as they are, from organisms of varying degrees of attenuation and virulence and depending upon individuals of equally variable resistance and ability to produce antibodies, can be nothing other than variable in their therapeutic value.

The degree of virulence which the organism causing measles is capable of reaching was very well illustrated in the army at Fort Sam Houston in the fall of 1917. It so happened that the large majority of the troops stationed there were young men who had resided all of their lives in rural sections. Most of them had never had measles before. They were a particularly fertile field for the organism which seemed to prevail in an exceptionally virulent form. Most of them had pneumonia following measles and this pneumonia was most unusual. It was characterized by empyema in almost every case. The mortality was almost 70 per cent. A similar epidemic occurred at Fort Logan Root in Arkansas about the same time. Dr. Dochez was one of the members of a board sent by the Rockefeller Institute to Fort Sam Houston and Dr. Dick was in the medical corps at Fort Logan Root. The organism causing the fatal empyema proved to be hemolytic streptococcus in pure culture. It is believed that the strains of this organism contributed largely to the studies of Dochez and Dick, which led to the discovery of the etiology of scarlet fever.

The outlook is rather hopeful so far as measles is concerned. Progress with the green-producing streptococcus first discovered by Ruth Tunnicliff seems to be encouraging. Ferry and Fisher are working with a similar organism in Detroit, and Caronia, who described an organism in Italy, is at present at work in California. Degwitz has produced a serum with the green-producing streptococcus, using both horses and goats, and Hoyne has produced one with goat serum in which the Tunnicliff strain was used as an antigen. Neither of these two sera were concentrated and the results so far have not been convincing.

In the meantime, measles is a very serious condition, more particularly, as Doctor Bivings has brought out, in young children. The epidemic at Fort Sam Houston, however, illustrates how serious it can be even in adults. I think work of the type that Dr. Bivings has reported should be kept up.

Dr. John Zahorsky, St. Louis, Mo.—I have not used parental blood serum, but I have used convalescent serum. All physicians are daily confronted with the problem of prophylaxis. When a child is exposed to scarlet fever or diphtheria, immunization can be done. If a mother telephones us that the baby has been exposed to measles (we do not want measles in babies; it is all right if the child is five or six years old), we can tell her that we can protect that child by drawing some blood from her and injecting it in the baby and can assure her that the child will not get measles at that time. This procedure is an advance in prophylaxis.

Dr. Eugene Rosamond, Memphis, Tenn.—I should like Dr. Bivings to say in his closing remarks whether he knows how long the immunity from convalescent serum lasts. One of my children was exposed to measles. I secured some convalescent serum and inoculated the rest of the family, and I have a large family. Three years later one of my boys came home with measles. I obtained more serum, got the Ruth Tunni-

cliff serum this time, and got an intense reaction. In due course the measles came.

Dr. Lewis W. Elias, Asheville, N. C.—Has Dr. Bivings had occasion to notice whether there is any sensitization from this serum and whether later it might cause trouble, in transfusions? That is a small matter to consider, of course.

Dr. Bivings (closing).—Dr. Strong brought out the question of the differences in immunity in different individuals. We realize that there is a difference, and we have had one interesting experience showing this. When we first began giving serum, in the first group, the serum was of my own blood and that of Dr. Dickson. The protection afforded by Dr. Dickson's serum, who had a very severe attack of measles a few years ago, was much greater than the protection from my serum. We have been able to overcome this difference by regulating the size of the dose. We believe that in the blood of any person who has had measles there is some immune substance and by giving large doses we have a margin of safety which will take care of variations and protect practically all cases.

Ordinarily measles causes few complications except in the very young or debilitated individuals. We had none in our series.

We purposely avoided discussion of animal serum because it is such an unsettled question. We believe that when we have ascertained the etiological factor in measles, serum will be used for the treatment of cases already infected or for the purpose of conferring some lasting immunity like that afforded by diphtheria immunization. Undoubtedly, some of you have seen unpleasant reactions following the use of animal serum. I avoid it whenever possible. There may be some of you who do not believe that toxin-antitoxin sensitizes to the serum of the animal from which it is made, but I do believe that all persons immunized with horse serum are potential reactors when horse serum is again used for any purpose. Therefore, I do not believe I should ever use measles antitoxin unless it were a question of choosing between serum reaction on the one hand and danger of measles in a debilitated child.

I do not believe I described the preparation of the serum. The blood is simply withdrawn into a sterile container and set aside in a cool place or in the ice box for from twelve to twenty-four hours. The serum will rise to the surface and can be drawn off easily into a large syringe and injected into the loose tissue between the scapulae. This location seems to cause less discomfort than any other we have tried.

We do not know whether sensitization occurs, but we have never had a reaction of any kind, and frequently the first injection of horse serum will cause a severe reaction.

We do not know how long the immunity lasts, except that it protects for several weeks. It is by no means an active immunity, but like antitoxin, it is passive and is eliminated. However, we see no reason why it cannot safely be repeated after a second exposure if it is considered best to protect the patient from measles.

UVEAL PIGMENT IN THE DIAGNOSIS AND TREATMENT OF SYMPATHETIC OPHTHALMIA*

By WILLIAM D. GILL, M.D., F.A.C.S.,
San Antonio, Texas.

Elschnig,[1 2 3 4] in 1910 and 1911, published the results of his investigations on the antigenic properties of uveal pigment in which he attempted to show that sympathetic ophthalmia is an anaphylactic disease or in its clinical course has an allergic phase, and that the anaphylactogen responsible for the production of sensitization is the pigment of the uveal tract. He found that certain laboratory animals could be highly immunized to uveal pigment and that uveal pigment antibodies appeared in the blood stream of the immunized animals. Subsequently Alan Wood,[5 6 7 8] in this country verified Elschnig's findings that the eye could be sensitized by intraperitoneal injection of uveal pigment and further demonstrated that anaphylactic phenomena could be elicited in it by antigen carried in the blood stream. Both Elschnig and Wood demonstrated by complement fixation that uveal pigment antibodies or anti-uveal precipitins are present in the blood stream in sympathetic ophthalmia, and they were of the opinion that this reaction is of value in prognosticating the course of the uveal inflammation.

Fortunately, the patient with sympathetic ophthalmia shows a definite cutaneous hypersensitiveness to uveal pigment, this being of the utmost practical value in foretelling the outcome of the inflammation in the eye. The complement fixation reaction has a limited field of usefulness because it is too complicated for general use and is adaptable only to the research laboratory. Its routine clinical application is not practical.

Arnold Knapp and Alan Wood[9 10 11] have investigated the therapeutic value of uveal pigment and conclude that immunity to uveal pigment protects against the development of sympathetic ophthalmia and that the development of sympathetic ophthalmia is dependent upon an existing hypersensitiveness to uveal pigment.

Cutaneous hypersensitiveness to uveal pigment as well as its degree may be demonstrated by the intradermal injection of uveal pigment which gives pertinent and precise information as to the

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Fig. 1
Armamentarium required for intradermal pigment test. The pigment suspensions are in rubber stoppered vaccine vials. Bovine serum in 1/1000 dilution, normal saline solution, and 0.15 per cent tricresol solution are similarly kept. A separate 2.00 c. c. Luer syringe is used for each solution. Alcohol 95 per cent is used for skin sterilization.

possibility of an impending sympathetic ophthalmia through the local reaction which it produces. The test is easy to perform and the pigment, when properly preserved, retains its antigenic properties for several weeks.

The pigment solutions used in the intradermal tests as well as in treatment are made from beef eyes. Uhlenhuth,[12] and others,[13 14 15] have demonstrated that uveal pigment in its immunological reactions is organ specific but not species specific. Therefore uveal pigment obtained from beef eyes may be employed diagnostically and therapeutically in man.

The eyes, used in the preparation of the pigment suspension, are removed from prime steers at the abbatoir and conveyed to the laboratory where the pigment suspension is prepared under the strictest aseptic precautions. The anterior segment of the globe with iris, lens, and cornea is cut away; the lens and vitreous body are removed; the retina is stripped up and the underlying chorioidal pigment collected. This is placed in a sterile mechanical shaker with glass beads and sterile isotonic saline solution and shaken from twenty-four to forty-eight hours to separate the pigment from the chorioidal vessels and to obtain a minute state of subdivision of the pigment particles. The pigment is removed by decanting and its concentration adjusted by the addition of normal saline solution so that each 7.5 c. c. contains the pigment from the uveal tract of one eye. This is known as the normal pigment suspension. It is tested for sterility both anaerobically and aerobically and, if it has been properly prepared, is free from contamination and may be kept without the addition of preservatives. From this so-called normal pigment suspension the various dilutions are made. If desired 0.15 per cent tricresol may be added as a preservative; however, a tricresol-free solution of pigment is preferable for skin testing.

In performing the test three points of pigment injection are made in the skin on the flexor surface of the forearm, the skin having been previously cleansed with alcohol. The injections are made with the normal pigment suspension, a 1-10 dilution and a 1-50 dilution of the normal pigment suspension. A fourth point of injection is made with a 1-1000 dilution of bovine serum as a control. If pigment suspensions preserved with tricresol have been employed a control of 0.15 per cent tricresol in normal saline is required because approximately 25 per cent of persons show cutaneous sensitiveness to tricresol. A control injection with normal saline may also be employed.

An ordinary Luer syringe armed with a needle of sufficiently large calibre to permit the free flow of the pigment suspension is used in making the injections. A wheal is raised at each point of injection approximately 1 cm. in diameter. Hypersensitiveness to uveal pigment results in an erythema about the pigment injections in from two to four hours and occasionally as late as eight or ten. The typical hypersensitive reaction makes its appearance as an erythematous area about each of the points of pigment injection, usually associated with some degree of induration near the point of injection. There is variation in the size of the wheals, depending upon the degree of hypersensitiveness present. The local reaction persists from eight to seventy-two hours and occasionally even longer. Sometimes an area of erythema appears in fifteen or twenty minutes associated with pseudopodic projections from its periphery. Only the late reaction is regarded as the true positive. Constitutional reactions such as temperature rise, nausea, vomiting and chilly sensations, while rare following the intradermal injection, are not unknown. They are more frequent after injections of pigment given for treatment than after skin tests, but even in this latter instance they are not frequent.

The intradermal injection of filtrates from normal pigment suspensions, obtained by passage through a Berkefeld filter, and filtrates from partially autolysed suspensions obtained similarly, have failed to produce skin reactions in sympathetic ophthalmia where the patient has previously exhibited hypersensitiveness to uveal pigment. This is considered additional proof that the antigenic properties of uveal pigment are inherent in the uveal pigment *per se*.

Some confusion may arise due to reaction, which occurs about the bovine serum control injection if full strength bovine serum is used, since approximately 90 per cent of normal individuals show some degree of local reaction to full strength bovine serum. The frequency of such reactions as well as their intensity is reduced by using the dilution recommended above. The local reaction caused by bovine serum differs from that caused by uveal pigment in its duration as well as in its intensity. If this is borne in mind no confusion should arise from this source.

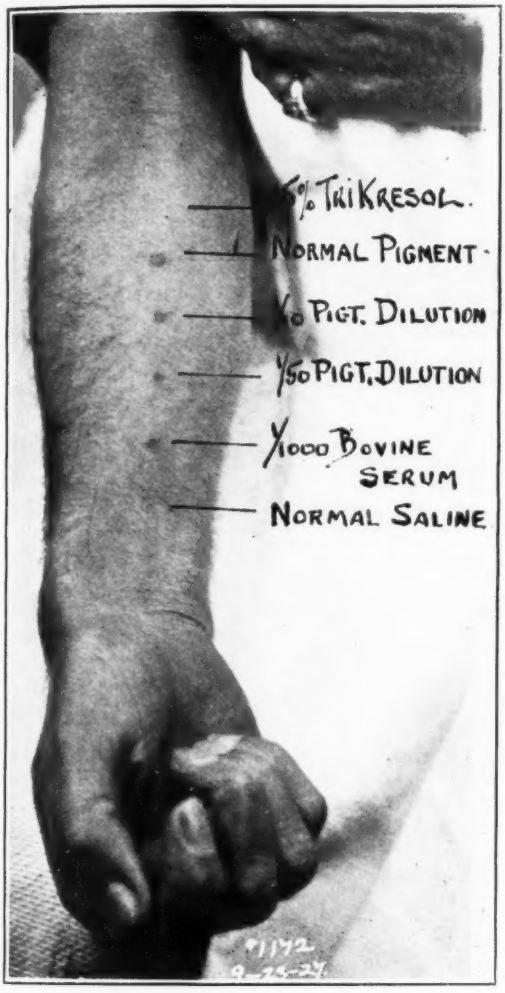

Fig. 2
Intradermal uveal pigment test. Points of injection on flexor surface of forearm and order in which they are arranged.

Elschnig[16] and Wood[17] assume that in injuries to the eye involving the uveal tract, absorption of uveal pigment occurs. The normal reaction of the organism is to develop an immunity to the pigment which not only leads to normal healing of the wound but also prevents further absorption of pigment. Failure to develop this immunity is accompanied by persistence of the inflammatory reaction in the eye and susceptibility of the organism to sympathetic ophthalmia. Slow absorption of uveal pigment appears to be necessary for the production of hypersensitiveness. True sympathetic ophthalmia does not develop under ten days, probably because this period of time is required for lysis and absorption of pigment and the production of sensitization.

Sympathetic ophthalmia may develop after accidental perforating wounds, intentional operative wounds and also after wounds without solution in continuity of the globe. It has even been known to follow the disintegration of an intraocular sarcoma with no associated wound of the eye.

In penetrating wounds of the globe, infection may arise from two sources. It may be introduced directly into the eye at the time the wound is received, that is, it may be ectogenous, or it may localize from some endogenous septic focus such as the teeth, tonsils, sinuses, gall-bladder or elsewhere. In either instance it may be so massive that frank suppuration takes place and removal of the globe is necessitated before hypersensitiveness can develop. In the event that frank suppuration does not take place only a low grade inflammation results, this being the type of reaction especially prone to lead to sympathetic ophthalmia. Wounding the eye creates an area of lowered resistance and makes elective localization of bacteria from endogenous foci more likely.

Rosenow[18] has pointed out the importance of focal infections in ocular inflammations and especially inflammations involving the uveal tract. It is believed that this relationship exists more frequently in sympathetic ophthalmia than is generally supposed, for it is usual to find some associated focus of infection present in patients with the disease, if careful search is made. The frequency of this association is so striking that it is difficult to concede that it is mere coincidence.

Elschnig[19] suggested this relationship prior to Rosenow's work when he made this significant statement:

> "If my theories are right, there is no radical difference between sympathetic iritis and the so-called idiopathic form either with reference to the disease of the two eyes or the course and outcome of the iridocyclitis."

More recently the word idiopathic has fallen into disrepute, and Rosenow's work on focal infections has explained many conditions formerly

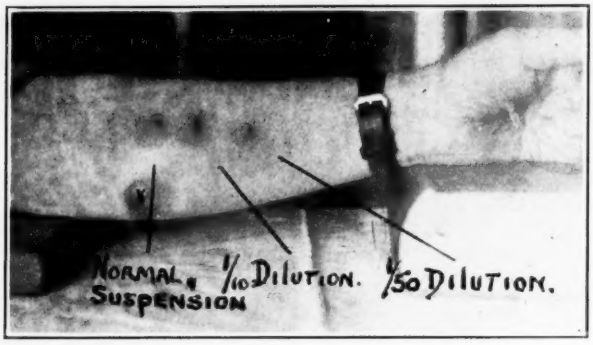

Fig. 3

A typical positive intradermal test with uveal pigment in a patient with sympathetic uveitis. The dark area at x is due to an artefact in the photographic plate.

designated as idiopathic, such as the idiopathic iritis referred to by Elschnig.

The leucocytes, which infiltrate the chorioid after an injury, bring with them enzymes which are capable of causing disintegration of all the body tissues, enzymes which are saccharolytic, lipolytic, and proteolytic. The protein-like uveal pigment is acted upon by these cellular enzymes and converted into a soluble substance, this soluble product being slowly absorbed and producing hypersensitiveness to uveal pigment. Once this hypersensitiveness is established a secondary reaction takes place wherever pigment is found in the body. If introduced into the skin an inflammatory reaction develops about the point of injection, and by the same token the presence of uveal pigment in the other eye will call forth an inflammatory reaction.

The research of von Szily,[20] and Gifford and Lucic,[21] indicates that other agents such as herpes virus also possess this lytic property against uveal pigment. Guiral and Guiral[22] believe that hyperacid cocaine solution has produced the same effect since they have seen numerous instances of sympathetic ophthalmia following cataract extraction in which this agent seemed responsible for producing the inflammation through lysis of uveal pigment.

The objection has been raised that absorption of uveal pigment is insufficient to cause papilledema, but it is a well known fact that circulating toxins from other sources are sufficient to produce edema of the optic nerve. Products from disintegration of uveal tissue will produce intoxication in lower animals with attendant ocular changes, as pointed out by Kodama,[23] who incidentally believes that many ocular tissues possess more than one antigen. This would explain the type of sympathetic uveitis associated with papilledema.

The ability of the patient to form uveal pigment antibodies in sympathetic ophthalmia is demonstrated by the positive complement fixation reaction in the blood serum during the disease, and any substance which increases their number will cause clinical improvement. The injection of tuberculin, milk, arsphenamine, diphtheria antitoxin, and various foreign protein preparations into a patient with sympathetic ophthalmia frequently leads to clinical improvement. These substances stimulate the defensive mechanism to hyperactivity with a resultant increase in uveal pigment antibodies. In this instance the substances referred to are acting as non-specific antigens.

By way of comparison it will be recalled that patients who have been immunized against typhoid fever by means of antityphoid vaccination show a positive Widal reaction for several months after their vaccination, the specific agglutinins eventually disappearing from the blood stream. Acquisition of some acute illness associated with fever causes these specific agglutinins to reappear in the blood stream and the Widal test again becomes positive.[24] The titer in this instance may even be higher than that following vaccination. This is cited as an instance of specific antibody response to non-specific stimulation; stimulation from totally unrelated antigens. If the theory of Elschnig is accepted the treatment of sympathetic ophthalmia must include desensitization of the patient with the production of specific protective antibodies by immunization. It is believed that these two phases of treatment occur simultaneously due to slow absorption of pigment after its injection.

The initial therapeutic dose of uveal pigment is 0.25 c. c. of the normal pigment suspension injected subcutaneously or intramuscularly. Every fourth day the dosage is increased 0.25 c. c. until a maximum of 2.00 c. c. is reached. If greater quantities of pigment seem indicated the concentration of the pigment solution may be increased and the volume correspondingly reduced. Four days after the last of these injections the patient receives a skin test to determine

whether desensitization has been accomplished. Only unheated uveal pigment is used in the skin tests as well as in treatment, because heating alters the uveal pigment and renders it less effective.

The response to this form of therapy is usually striking; but where damage to the eye from sympathetic disease has been great, the acute inflammatory reaction in the eye may subside and improvement so far as vision is concerned cannot be obtained. Iris adhesions and pupillary exudates will not be absorbed by uveal pigment nor will shrunken phthisical eyes be restored to normal by it. Pigment therapy may produce clinical improvement, but cutaneous hypersensitiveness to pigment may persist despite the fact that clinical improvement has taken place.

The specific uveal pigment antibodies are probably formed by fixed cellular elements and the acquisition of specific immunity is therefore a cellular reaction rather than a serological one. Once the fixed cellular elements of the body acquire the ability to form these antibodies a definite form of immunity is established, but the degree of immunity is subject to fluctuation. This is important, as it will be necessary to resume pigment therapy if there is a return of inflammation in the eye.

In the treatment of sympathetic ophthalmia it is essential that all foci of infection be eliminated. The colon should not be overlooked, as Keating[25] has demonstrated that it may act as an endogenous focus of infection and that the *Streptococcus hemolyticus* is frequent the infecting organism.

Many forms of treatment can be combined to advantage, and while uveal pigment therapy in sympathetic ophthalmia apparently offers the greatest hope for this unfortunate class of patients, because of its seemingly specific immunizing properties, it is not recommended to the exclusion of other forms of treatment, but only as an adjunct.

The following brief case reports are illustrative of the results obtained by uveal pigment desensitization in a series of patients with sympathetic ophthalmia. The diagnosis in these patients has been based on the objective clinical findings and the course of the disease, together with the presence of cutaneous hypersensitiveness to uveal pigment. Unfortunately the complement fixation reaction was not available in studying these patients.

Theoretically, uveal pigment therapy should rob sympathetic ophthalmia of much of its horror and save many eyes from enucleation; but it is essential, if the best results are to be obtained, that treatment be instituted early to avoid the inevitable and tragic sequel of blindness.

One should not act too hastily in advising enucleation of the exciting eye in patients who have developed sympathetic uveitis in the other eye, for not infrequently when the inflammation has abated it will be found that the exciting eye has suffered less damage than the sympathizing eye and therefore is the better of the two eyes.

Case 1.—McC. R. J., aged 36, was referred by Dr. Scott Bronson, of San Antonio, June 16, 1928. The left eye had been enucleated in December, 1927, because of a recurrent inflammatory reaction following an injury which occurred thirty years previously (1898). There was evidence of inflammation in the right eye in October, 1927, which persisted for eighteen days and finally subsided. Following this, there were four addi-

TABLE I

Patient	Age	Intradermal Pigment test	Initial Vision		Tuberculin test	Wass.	Focal Infect.	Final Vision	
1. McC. R. J.	36	+ +	O. D. 4/300	O. S. Enucleated	Ft. Local	Neg.	Teeth Tonsils	O. D. 10/100 (5/200)*	O. S. Enuc.
2. H. R.	15	+ + +	O. D. 20/200	O. S. 10/200	Negative	Neg.	Left Antrum	O. D. 20/20	O. S. 10/40-3
3. H. E. C.	62	+ + + +	O. D. P. L.	O. S. Blind	Not made	Neg.	Teeth	O. D. P. L.	O. S. Blind
4. P. T. C.	46	+ + + +	O. D. 2/200	O. S. Enucleated	Not made	Neg.	Teeth Colon	O. D. 20/100	O. S. Enuc.
5. S. W. D	52	+ + +	O. D. 6/200	O. S. Enucleated	Negative	Neg.	Teeth Colon	O. D. 20/100	O. S. Enuc.
6. H. I.	47	+ +	O. D. Enucleated	O. S. Fingers 18 in.	Negative	Neg.	Teeth Colon Ethmoids Antrum	O. D. Enuc.	O .S. 10/100 (P.L.)†
7. C. R.	37	+ + +	O. D. P. L.	O. S. 10/100	Negative	Neg.	None?	O. D. 10/50	O. S. 10/40

*Subsequent visual reduction due to retinal detachment.
†Subsequent visual reduction due to development of lenticular cataract.

tional attacks of inflammation in the right eye which varied from eleven to twenty-eight days. On examination, June 16, 1928, the vision was found to be 4/300. The patient was experiencing subjective flashes of light. Intense circumcorneal injection was present, the pupil was fixed in mid-dilatation with numerous adhesions. Some deposits of pigment were present on the anterior lens capsule. No fundus details were visible either by direct or indirect ophthalmoscopy. There was an isolated point of tenderness in the superior nasal quadrant of the globe. The iris was hazy, and its markings were practically obliterated. Hypopyon was present, moderate in degree. The Wassermann was negative. Foci of infection found in the tonsils and the teeth were eliminated. The uveal pigment test, June 17, 1928, was positive in three hours. Uveal pigment therapy was started with 0.25 c. c. of the normal pigment suspension intramuscularly. Twenty-four hours following the first injection of uveal pigment the patient experienced marked relief from pain in the right eye and the circumcorneal hyperemia began to subside. By June 22, all inflammatory reaction in the eye had subsided, and the vision had risen to 10/200. Numerous floating opacities were still present in the vitreous. There were still subjective flashes of light. This patient's vision improved at one time to 10/100. On August 24, 1928, the patient stated that the vision had suddenly become markedly impaired. It was then 5/200 eccentrically. A large gibbous detachment of the retina was noted in the superior temporal portion of the globe. There was an associated attack of rheumatic fever which confined the patient to his bed for two weeks, during which time effusion into several joints occurred. Pigment therapy was resumed beginning with 2.00 c. c. of the normal pigment suspension. This patient was slightly hypersensitive to tuberculin locally, but there were no associated focal or constitutional reactions. Numerous foci of infection were present which were not eradicated early and it is believed that there was some other focus of infection responsible for the continuance of his inflammatory symptoms in the right eye, though his failure to cooperate fully did not permit its being discovered. Unfortunately, the retinal detachment which came on during treatment precluded the possibility of any further improvement. This patient showed definite improvement during treatment with uveal pigment and it is regrettable that the retinal detachment occurred to destroy the possibility of benefit from this form of treatment. The patient's change of residence to another city caused us to lose contact, and efforts to trace him have met with no success.

Case 2.—Miss H. R., a white girl of fifteen years, was referred through the courtesy of Dr. J. H. Burleson, of San Antonio, Texas, on August 16, 1928. On April 28, 1928, the patient was struck in the left eye with a staple which inflicted a wound at the superior temporal limbus. Treatment was given by a specialist in her home town. Six weeks after her injury, the vision in the other eye began to fail. When first seen by the writer the vision in the right eye was 20/200 and in the left was 10/200. The pupils were unequal, the right being irregularly dilated, the left widely dilated. Neither responded to light stimulation (atropine). The tension was normal in the right eye, but was much reduced in the left eye. Decemetitis (punctate) was present in both eyes. An abnormal fluidity of the vitreous and large shreds of floating exudate were present in both eyes, but otherwise no fundus details were visible. The Wassermann was negative. Both globes were tender to palpation. The tonsils had been cleanly removed. The x-ray showed slight clouding of the left maxillary antrum. June 16, 1928, the patient was markedly sensitive to uveal pigment, the test being positive in three hours and remaining so for 48 hours. The diagnosis of sympathetic ophthalmia was made and pigment therapy begun. Forty-eight hours after the first injection of uveal pigment, the vision in the right eye had risen to 20/30, that in the left eye being unchanged. In seventy-two hours, the vision in the left eye had risen to 20/20-6 and the vitreous had cleared remarkably. The desensitizing course was completed but an Arthus* phenomenon appeared in the left eye. The lens was pushed forward by ciliary and chorioidal edema giving rise to an increase in tension.

Vitreous was aspirated from the left eye three times by the method of Zur Nedden. The corneal deposits cleared completely. In four weeks the vision had risen to O. D. 10/40-3 and O. S. 20/20. The right eye was no longer sensitive to light. The left eye in which we expected little or no improvement in vision, improved to 10/40-3. The tension in the left eye has fluctuated slightly. An iridectomy was performed but was partially blocked by exudate. Following this operation the tension remained normal. The tension remained at a normal level. In the first vitreous aspiration 0.2 c. c. were aspirated, in the second 0.4 c. c. and in the third 0.6 c. c. were removed, a total of 1.2 c. c. Irrigation of the left maxillary sinus removed a few shreds of pus and a large quantity of mucus. This patient has had no return of her symptoms for over a year, and the vision has remained O. D. 20/20, O. S. 10/40-3.

Case 3.—Mr. H. E. C., aged 62 years, a white man, in November, 1926, received the charge from both barrels of a double barrel shotgun loaded with bird shot in the eyes. The shot traversed both globes, and passed entirely through the nasal fossae. They also entered the neck and caused a section of the left recurrent laryngeal nerve, and several lodged in the chest. The immediate post-traumatic course was extremely stormy. The patient developed a traumatic bronchopneumonia which finally subsided. Massive intra-ocular hemorrhage was present in both eyes with large defects in the retina and chorioid of the left eye. The globes were allowed to remain *in situ* and eventually healed but remained painful. The right eye had questionable perception of light in the temporal field. The left eye was absolutely blind. The tension in both globes was much reduced. This was a hopeless type of injury from the beginning so far as vision was concerned. Immediately following the patient's recovery from pneumonia, the eyes became quiet, but at intervals of two weeks to a month a recurrent inflammatory reaction would take place in the eyes associated with considerable pain. This patient was seen by Dr. W. H. Wilmer, of Baltimore, and the diagnosis of a sympathetic ophthalmia was verified. In September, 1927, an intradermal uveal pigment test was positive in three hours and remained so for seventy-two hours, associated with slight temperature rise, chilly sensations and restlessness. A course of ten injections of pigment was given. The eyes responded promptly and soon lost their congested appearance and the pain disappeared. Five months following desensitization and immunization there was no recurrence of the inflammation. The patient was made comfortable by the pigment injections and enucleation

*An Arthus phenomenon is an inflammation about the points of original absorption, occurring in a partially immunized organism, following fresh absorption of the specific antigen.

was avoided. Dental foci of infection were present which were eliminated. The Wassermann reaction was negative.

Case 4.—Mr. P. T. C., aged 46 years, a white man, was referred by Dr. Oscar Wilkinson, of Washington, D. C., in September, 1927. He gave a history of an injury to left eye in 1907 which had necessitated enucleation. The cause of the injury and the interval of time which elapsed between the injury and the enucleation could not be revealed in questioning the patient. In 1922, fifteen years after his left eye was injured, the vision of the right eye began to fail and numerous subjective floating bodies appeared before the eye. The eye was quite uncomfortable at times, but there were intervals during which the patient states that he was free from pain. The visual failure progressed and the opacities increased in spite of treatment. This patient was seen in September, 1927, at which time the vision was O. D. 2/200 which was uncorrectable. There was moderate circumcorneal injection, the intra-ocular tension was subnormal and the vitreous was abnormally fluid and filled with exudate. Cataractous change was present in the lens. The Wassermann reaction was negative. An intradermal pigment test, October 12, 1928, was positive in four hours. Twenty-four hours after the first pigment injection the patient's vision had risen to 5/200, which was correctable to 20/200. A remarkable clearing of the vitreous occurred, but the cataractous change in the lens was unchanged. Following ten injections of uveal pigment, vision of 20/200 was obtained which was correctable with a –2.75 sph. to 20/70. On completing the treatments, the patient was able to drive his own automobile into the city, a thing he had not been able to do for a number of years. A subsequent report on this patient indicates that his vision has improved somewhat since the last record was made.

Case 5.—Mr. S. W. D., aged 52 years, a white man, was referred by Dr. B. F. Sharpton, of Fort Sam Houston, Texas, in June, 1927. He had received an injury to the left eye in 1902 from an explosion of a locomotive water gauge, which necessitated enucleation. The interval between the injury and the enucleation is not known. The vision in the right eye had become markedly impaired following the injury and there was an attendant inflammation of the eye which finally subsided. In December, 1925, the vision became suddenly much worse. At that time, the patient noticed black specks before the eye which seemed to him to be the cause of the visual impairment. The eye was painful and slightly inflamed, but due to his residence in Mexico at that time he was unable to obtain the services of an ophthalmologist near his home. At the time he was seen by the writer (June, 1927) examination of the right eye showed vision of 6/200. The tension was slightly subnormal to palpation. Examination of the fundus showed a large gibbous type of retinal detachment, and an exudative uveitis, the vitreous being abnormally fluid and containing many floating opacities. A few fine blood vessels were running into the vitreous from the retinal detachment. The Wassermann test was negative. The blood picture was normal. A diagnosis of sympathetic uveitis with secondary changes in the eye was made. An intradermal pigment test, June 6, 1927, showed the patient to be positive at the end of two hours and remaining so for forty-eight hours. A series of eight injections of uveal pigment were given; with resultant vision of 20/100. Little improvement could be anticipated in this patient due to the duration of inflammation in the eye, and the subsequent changes which had taken place. It is believed that the visual impairment which this patient suffered soon after the injury to the left eye was due to sympathetic uveitis, and that the additional diminution which came in 1925 was due to the appearance of the retinal detachment.

Case 6.—Miss H. I., aged 47 years, was referred by Dr. J. H. Burleson, of San Antonio, Texas, August 27, 1928. In September, 1928, an acute glaucoma, associated with lenticular cataract, developed in the right eye. The usual medical treatment was employed and the patient improved and remained free from pain for approximately one year. In June, 1928, there was return of pain in the right eye. An iridectomy was performed at that time and for three weeks following the operation the eye remained clear. At the end of that time, the increase of tension returned. Twenty-nine days after the iridectomy, the left eye became inflamed and painful and the vision became blurred. The right eye was immediately enucleated. Postoperative convalescence was uneventful so far as the enucleation was concerned. The patient was seen in consultation August 29, 1928, at which time the findings were, plastic iritis of the left eye associated with elevation of tension. The iris was bound down to the lens at the pupillary margin and iris bombe was present. The globe was sensitive to palpation. An intradermal pigment test was made which became characteristically positive in two hours, remaining positive for approximately thirty-six hours. The initial vision was fingers at 18 inches. Twenty-four hours following the first injection of uveal pigment, the patient's vision increased to fingers at 7 feet, and after the second injection it rose to 10/100. At this time there was evidence of cataractous change in the lens. September 21, 1928, iris transfixion was considered advisable and was performed and resulted in prompt reduction of the intra-ocular tension, subsidence of pain, and vision of 10/200. X-ray revealed cloudiness of the anterior ethmoids on the left side. The Wassermann reaction was negative. Since November 2, there has been a slight fluctuation in the tension, but most of the time it has remained at a normal level. The cataractous change in the lens has progressed and has reduced vision to perception of light. It is anticipated that removal of the cataract will restore some vision, though the amount to be regained is open to speculation.

Case 7.—Mr. C. R., aged 25 years, referred by Dr. C. H. Boehs, of San Antonio, Texas, was struck in the right eye with a piece of steel, October 18, 1928. A wound was inflicted in the superior temporal limbus. Two hours following the injury, the steel was removed with the aid of a magnet. The right eye was slow in healing, an iritis developing which persisted for several weeks. Twenty-nine days following the injury to the right eye the vision in the left eye became impaired. He was seen in consultation December 5, 1928. In the right eye there was perception of light; in the left eye vision was 10/100.

Examination revealed a small scar in the cornea of the right eye, at the superior temporal limbus, apparently the entrance point of the foreign body. The slit lamp revealed a few punctate deposits on Decemet's membrane in the left eye. The iris of the right eye was adherent to the lens capsule at several points. Numerous pigment deposits representing previous attachment points between the iris and lens were present on the anterior lens capsule. There was an ectropion of the uvea at three points on the pupillary margin. The iris

crypts were widely opened and the iris showed several points of atrophy. There was a moderate degree of circumcorneal injection in the right eye and the globe was slightly sensitive to palpation. The tension was normal. No fundus details could be made out because of the numerous dense opacities present in the vitreous. Examination of the left eye showed the pupil to be dilated regularly, no adhesions being present. Tension was normal. The vitreous contained numerous opacities and was abnormally fluid. The optic nerve head was faintly visible and was unaltered in its level and margins. Slight pallor of the papillomacular segment was noted in contrast to the remainder of the nerve head, which was quite hyperemic.

Intracutaneous pigment test, December 5, 1928, was positive in four hours, remaining so for approximately thirty-six hours. There was considerable induration about all points of injection in addition to the usual erythematous zone. Within two days following the first pigment injection, the vitreous of the left eye began to clear and the vision had risen to 10/50-3. At this time several areas of acute chorioretinitis were discerned in the left eye, which had previously not been noted because of the cloudy vitreous. Several glistening areas were noted which were interpreted as cholesterin crystals underneath the retina. The right eye was less painful, but no clearing was noted in the vitreous. Immediately after completion of the pigment injections, the vision was O. D., perception of light, O. S. 10/50. The vitreous of the left eye was clear, but the fundus changes otherwise remained unchanged. No fundus details were visible in the right eye, as the vitreous in this eye had cleared only slightly. In June, 1929, the patient returned and stated that he felt that he had derived so much benefit from the previous treatment, that he wanted it repeated. A pigment test at this time revealed a very faint positive reaction in three hours which faded in twenty-four hours. Vision at this time was O. D. 10/200 and O. S. 10/50. A second series of eight injections was administered and during this treatment the vitreous of the right eye cleared so much that the vessels and nerve head could be made out. All external acute inflammatory reaction had subsided in both eyes. The eyes were comfortable. Final vision obtained was O. D. 10/50, O. S. 10/40, which was not correctable above this point.

This case illustrates the benefit which may be derived by perseverance in treatment, as results are slow in being attained in most patients with sympathetic uveitis. No foci of infection were found. The Wassermann and blood picture were normal.

CONCLUSIONS

(1) Sympathetic ophthalmia or sympathetic uveitis has an allergic phase in its course and uveal pigment appears to be the anaphylactogen responsible for production of sensitization.

(2) Intradermal injection of uveal pigment suspensions will reveal hypersensitiveness to uveal pigment.

(3) Clinical improvement, at times spectacular, follows the employment of uveal pigment therapy in sympathetic ophthalmia, provided it is used early in the disease.

(4) Focal infections frequently appear to bear a definite relationship to the production of sympathetic ophthalmia.

(5) Other forms of treatment may be combined with uveal pigment therapy to good advantage.

(6) Enucleation is often avoided by using uveal pigment therapy early in sympathetic ophthalmia.

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DISCUSSION (*Abstract*)

Dr. Bascom H. Palmer, Jr., Miami, Fla.—Dr. Gill has made a searching review of the literature on this subject, and while the investigations which he and other men have made are most excellent, and would seem to point the way to more scientific management of these cases, I would direct attention to the comparatively small number of actual cases that have been treated (on the premise that ophthalmia sympathetica is due to an anaphylactic reaction in the sympathizing eye because of the absorption of uveal pigment from the exciting eye) and urge that our opinions for the present be reserved. There is no question as to the ability of the human body to develop specific antibodies to uveal pigment, as demonstrated by complement fixation, or that certain individuals may or may not show a specific sensitization, for these are common serological procedures; but the thought that the slow absorption alone

of uveal pigment from an exciting eye is productive of an allergic sensitization of the uvea in the sound eye is not one to be accepted before the observation and treatment of a much larger number of cases. It is a common observation in the routine attempt at diagnosis of asthma and hay fever that we often find skin reactions to certain protein and non-protein substances indicating a specific sensitization, but we do not always accept them as being more than a suggestion as to the cause of the disease, and this might be considered the present status of this great subject.

I should particularly like to emphasize the essayist's words on the relation between all cases of uveitis and focal infections.

Dr. Gill has contributed greatly to this subject, not only through the presentation of his own cases and experiences, but also by the stimulation of a more widespread interest in his subject. When a larger number of cases are on record we can arrive at a more accurate estimate of the value of uveal pigment injections, both as a preventive and a therapeutic measure.

Dr. J. W. Jervey, Greenville, S. C.—Sympathetic ophthalmia clinically is seldom if ever positively diagnosed. Microscopically, it is diagnosed, but then it is too late. In other words, the clinical diagnosis of sympathetic ophthalmia is a presumptive diagnosis nearly always, if not always. If uveal pigment will give us a reaction which is definitely distinctive of the presence of sympathetic ophthalmia, then we have something valuable to us in our practical, everyday work; but my impression is that we may get a local positive reaction from an injection of uveal pigment even when there is no sympathetic ophthalmia present. While the use of uveal pigment may eventually be shown to be of immense importance in the therapy of the disease, yet we have a reasonably dependable therapy at the present time in the use of parenteral protein injections and many cases have been reported of cures by this means. Until still more work is done on this subject it would be very unwise for us to discard protein injections, such as milk, and use uveal pigment exclusively, even experimentally, in our practice.

Dr. Gill's recommendation against enucleation in sympathetic uveitis is, of course, absolutely correct. We are hardly justified in removing an eye that has any vision, with the sole exception of eyes which have malignancy of the bulb. Therefore we must conserve the eye even when we are satisfied presumptively that there is sympathetic ophthalmia.

Dr. O. H. Judkins, San Antonio, Texas.—I am familiar with two of the cases which Dr. Gill reports, as they were referred to him by my associate, Dr. J. H. Burleson. I refer to *Case 2* and *Case 6*, both of which I saw in consultation. *Case 2*, a young girl of fifteen years, presented a striking result. She had developed a sympathetic ophthalmia twenty-one days after the injury to the other eye, and when first seen by Dr. Gill the vision in the sympathizing eye was reduced to counting fingers at four feet. It was my very great pleasure to see this patient regain a vision of 20/40 under treatment with uveal pigment.

I am very anxious that Dr. Gill continue his experiments.

Dr. Dunbar Roy, Atlanta, Ga.—The diagnosis of sympathetic inflammation depends upon the man who sees the cases. For fifteen years I did not see such a case and did not think such a thing as sympathetic ophthalmia existed. After that I had six cases, one after another, and then I knew that there was such a thing as sympathetic inflammation. At that time, twenty years ago, Dr. Gifford had recommended giving massive doses of salicylate of soda, which I did, getting very poor results. Later Dr. Verhoeff recommended the injection of antitoxin and reported a number of successful cases. Since Dr. Allan Wood has suggested uveal pigment, I think we are nearing the solution of this problem. It may be only a few years before nearly all severe inflammatory conditions which do not require surgical interference will be treated medically. They may be cured by injections of some kind. There is nothing that gives you so much worry and trouble as an injured eye, with a sympathetic ophthalmia in the other eye.

I should like to ask Dr. Gill how long one should wait before giving these injections, when there is the possibility of sympathetic ophthalmia. Are they used as a preventive measure? Must the solution be made up fresh for each injection, or can it be kept for some time? The solutions recommended by Dr. Davis, of New York, for the cure of cataract, are put up by Mulford and we can get them rather easily. I believe Dr. Gill is on the right line. These injections certainly do no harm and there is the possibility of a cure.

If there is involvement of the good eye and absolutely no vision in the injured eye, would Dr. Gill advise using this injection in the hope of saving some vision in the injured eye as well as in the other, or would he enucleate immediately?

Dr. E. H. Cary, Dallas, Texas.—I do not know as much about sympathetic ophthalmia now as I did several years ago. At least, I am more in doubt about what I know now.

Recently at the American Academy Dr. Georgiana Theobald, of Chicago, described a study of 50 eyes that had been enucleated with supposedly sympathetic ophthalmia of the other eye. About seven of them were true sympathetic ophthalmia. I agree with Dr. Jervey, that it is a very difficult thing to know just when you have sympathetic ophthalmia and when you have not. In one case I followed Dr. Fisher's method of serum injection and had a very satisfactory result. I could not say, in the light of what we know now, that the patient had sympathetic ophthalmia. I am not decrying the work that Dr. Gill is doing. Any work that will more specifically define this disease will be helpful.

Undoubtedly, allergic reactions are important throughout the body. The reaction of an individual to a protein is valuable in the prognosis of a given disease. The work of Descartes and Gougerat has been very valuable in guiding syphilologists in their prognosis in this particular disease.

I agree with Dr. Roy that we had better put as many of these cases as we can into the hands of some man who has gone into the subject as Dr. Gill has, and let him work out, if he can, the differential reactions. I would have him cleanse himself of any preconceived diagnostic notions and become skeptical.

Dr. Gill (closing).—If any good is to be accomplished from this form of therapy it must be used early in the disease. Secondary changes such as phthisis bulbi and retinal detachment will modify its beneficial effects; therefore, the earlier it is employed the better the ultimate result. It is not intended that uveal pigment should displace other forms of treatment in sympathetic uveitis, but it is most certainly a valuable adjunct. I am not prepared to answer Dr. Roy's question concerning the prophylactic use of uveal pigment in sympathetic ophthalmia as I have had no experience with this therapeutic agent in a preventive capacity.

Uveal pigment suspensions may be prepared fresh for each patient, but the suspensions preserved by the addition of 0.15 per cent tricresol apparently retain their full antigenic properties and may be employed therapeutically just as freshly prepared solutions are used. Suspensions preserved with tricresol are not ordinarily used in skin testing, as it has been found that many patients are sensitive to tricresol alone. If, however, the patient does not give a positive reaction to 0.15 per cent tricresol injected intracutaneously, then a skin test with uveal pigment suspension preserved with tricresol is of value in determining hypersensitiveness to uveal pigment. In our investigation we have preferred to use carefully prepared sterile pigment suspensions free from preservatives of any kind. The suspensions prepared aseptically keep for several months if properly stored. Those to which tricresol is added will remain unchanged for a longer period of time. Special laboratory equipment is necessary for the preparation of uveal pigment suspensions, and special laboratory technic is essential. It is an expensive procedure, but the expenditure is justified by the results obtained.

Once sympathetic ophthalmia is definitely established we should be ultra conservative in advising or performing enucleation. Each case must be decided upon its individual merits. In two patients whose case histories are reported in this paper, it will be noted that enucleation was not performed. Improvement in vision took place not only in the sympathizing eye, but in the exciting eye in each instance.

It is true that uveal pigment will give positive cutaneous reactions in conditions other than sympathetic uveitis, such as retinitis pigmentosa and uveitis due to focal infection with no associated traumatism. However, no confusion should arise in differentiating these conditions by their clinical course, as well as the objective findings.

The skin converts uveal pigment more rapidly than the subcutaneous tissues, and the response to uveal pigment injected intracutaneously appears to be greater than when the suspensions are given subcutaneously.

I am deeply grateful to my colleagues who made this investigation possible through their cooperation in referring these patients for study and treatment.

SECONDARY HYPERTROPHIC OSTEO-ARTHROPATHY WITH CASE REPORT*

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Hypertrophic pulmonary osteo-arthropathy may be defined as a disease of secondary nature, occurring in the course of various chronic conditions, characterized clinically by enlargement of the extremities, with clubbing of the fingers, thickening of and around the joints, and anatomically by thickening of the soft parts, especially of the distal phalanges and proliferative processes of the periosteum, particularly at the lower ends of the bones.

A review of the available literature, of which there is a great volume, and incidentally it may be stated that there has been nothing added to clear up this phenomenon since the disease was first reported by Bamberger[2] in March, 1889, appears to agree on a division into three classes. These are really no more than stages.

(1) Pure clubbed fingers.

(2) Those with clubbing of the fingers and transitory periosteal changes along the bones of the extremities.

(3) The severe picture. In addition to clubbed fingers there are productive periosteal bone deposits in most parts of the bony skeleton (Marie's type).

(4) Hogler adds a last class where there are changes along the long bones, without clubbing of the fingers. This last case was reported by Schlagenhaufer.

(1) Carr states that probably the majority of cases with clubbed fingers will show bone disease if a careful x-ray is made. This has not been true in several cases I have studied.

Historically, Bamberger[2] reported this condition first in March, 1889, forty years ago, to the medical society of Vienna. In 1890, Marie reported eight cases, describing in detail the long bone changes. These findings have been given the name "Marie's sign group." He really published the first thorough description of the syndrome.

Since then a large number of cases have been reported, with speculations as to the cause of the periosteal changes. The clinical and pathological features are well established. It is in connection with the etiology and pathogenesis that dispute has been most constant. The es-

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Fig. 1
Left hand and wrist. Note burr-like formation of bone along the margins of the phalanges, also between the radius and ulna. Periosteal bone production along the shafts of radius and ulna. Joint surfaces uninvolved.

Fig. 2
Periosteal bone production along margins of the metatarsals.

Fig. 3
Overgrowths of periosteal bone along the shafts of femurs, tibia and fibula. Joint surfaces uninvolved. These bones were greatly increased in size.

sential pathology is a periosteal calcium deposit, usually separate and distinct from the shaft. The greatest involvement is near the lower ends. Rarely does this deposit extend below the junction of the periosteum and synovia. The disease has been called ossifying periostitis. But this is wrong, as there is no evidence on section of an inflammatory process. Hogler states that the shaft of the bone is intact, and that the thickening rests exclusively on the periosteal deposits. These deposits are hyperplastic, not inflammatory. Kauffman and Locke state that the joints participate in this morbid process. This is denied by others. In our case the joints are not involved.

It must be remembered this disease is secondary. It has never been observed as a primary lesion.

It has been reported as secondary to the following diseases:

(1) Diseases characterized by purulent and gangrenous processes in the body, for example: pulmonary tuberculosis with cavity; bronchiectasis, empyema, dysentery, pyonephritis.

(2) Infectious diseases and chronic intoxications, such as pneumonia, pleurisy, syphilis, or alcoholism.

(3) Cardiac diseases, especially of a congenital type.

(4) Malignant tumors of the lungs and pleura.

(5) Diseases of the nervous system, such as syringomyelia, or neuritis.

The cause was discussed in Bamberger's first report in 1889, and the question asked, is the condition caused by infectious toxin or by a disturbed circulatory condition, for example, hyperemia?

Today it is believed it may result from either cause, either sepsis or a circulatory disturbance. Yet cases have occurred with unilateral clubbing which are unexplainable.

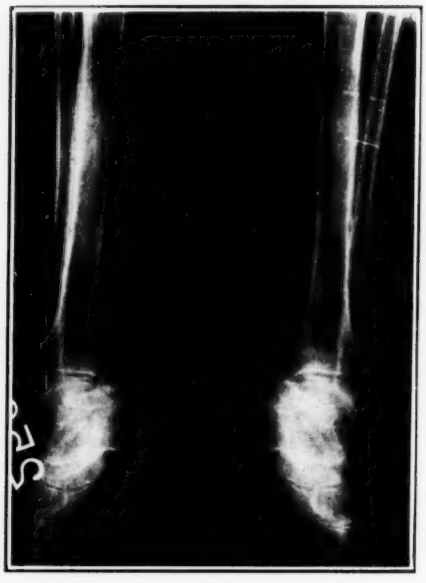

Fig. 4
Marked periosteal bone production along leg bones. Joints uninvolved.

Fig. 5
Irregular thickening of the cranial bones over frontal and occipital regions. Sella small. No evidence of acromegaly.

There has been no addition to the explanation of the cause since the first case was reported forty years ago.

Patterson, in the *British Journal of Radiology* in 1927, reported a case associated with a mediastinal tumor. He radiated the tumor and reported improve-

Fig. 6
Hypertrophic spurs along margins of lumbar vertebra. Probably not connected with this disease.

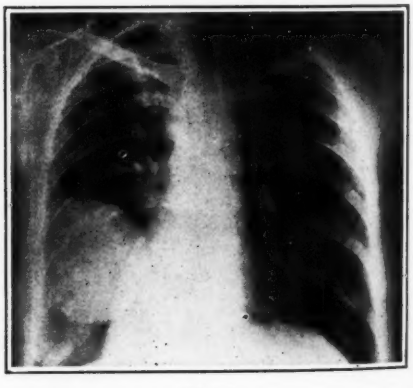

Fig. 7
Large annular tumor in left lower chest. This is within the lung. Margins distinct. Left breast hangs below the tumor. Right breast has been amputated.

ment, both in the bone changes and the size of the tumor, with marked improvement in the general condition of the patient. Although she later died, she remained well for two years following treatment.

The following is a report of a case which I have seen:

The patient was a woman, age fifty-two, whose family history was negative for cancer and tuberculosis. She was a housewife. She drank three cups of coffee daily, was in a good state of nutrition with a good appetite, and weighed 215-225 pounds.

She had had measles, mumps, whooping cough and diphtheria as a child, and a mild case of influenza in 1917. The right breast was amputated in 1926, after a diagnosis of lipoma, according to her husband. She had colitis of four weeks duration, beginning four weeks after this operation.

Present Illness.—In November, 1927, she began to have swelling of the feet with much pain. She changed shoes, but had no relief. She consulted a physician, who put her to bed from November, 1927, until April, 1928. During this time there was swelling and pain in her ankles and knees, but no fever. She got out of bed, but the pain and swelling persisted, although it was not quite so severe as formerly. She remained up until November, 1928, when she returned to her bed. In April, 1929, she was able to get up in a rolling chair, but about this time her hands began to swell and she had a great deal of pain in the joints of her fingers. She lost weight in April, but at the time of examination was gaining in weight. In May, 1929, she took a dose of turpentine (gtts. X), for pain in her epigastrium and immediately began to have pain in the lower left thorax, which had persisted ever since. She had had some fever since June, 1929; also frequent and burning micturition. There had been no hematuria nor digestive disturbances, but she had had chronic constipation and took laxatives frequently. She had two children, twenty-two and ten years of age, respectively. She had not menstruated since the birth of the last child. She had an intolerance for opiates. She had taken empirin for pain and had been in charge of various physicians during the previous two years.

Laboratory Studies.—Red blood cells were 2,930,000; hemoglobin, 52 per cent; white blood cells, 7,650; polymorphonuclears, 64 per cent; large lymphocytes, 5 per cent; small, 29 per cent; transitionals, 2 per cent.

Urinalysis showed a specific gravity of 1.006. The urine was neutral in reaction, with a faint trace of albumin. There were a few epithelial cells, and 8-10 pus cells in a centrifuged specimen in each high power field.

Wassermann and Kahn were negative. Upon repetition ten days later they were still negative.

Roentgenological Examinations.—The gastro-intestinal tract was practically negative except for colonic stasis. The Graham test of gall-bladder function was practically normal. The sinuses were normal. The skull showed a slight thickening in the anterior frontal area. The sella was normal in size, and the clinoidal processes were normal.

Bony Skeleton.—There was a marked production of new bone, deposited below the periosteum, along the shafts of all the long bones. The greatest involvement was noted on the femurs, clavicles, metatarsals, metacarpals and phalanges, as a thick, white, striated band, distinctly separated from the cortex and terminating at the junction of the periosteum and synovial membrane. On the phalanges, metacarpals, and metatarsals also, it was roughened and gave a burr-like appearance. The tarsal and carpal bones were uninvolved. The ankles, wrists and knee joints were greatly thickened, due to bone production and to induration of the soft tissue structures. The nails were markedly clubbed.

Chest.—The lung fields were essentially negative for infiltrations. The heart and aorta were normal in size and shape. The right breast was absent. There was no evidence of abnormality in or around the scar. In the left lower lung, posteriorly, was a round shadow about the size of an orange, definitely within the lung tissue. Its margins were clear cut and distinct. Its type was unknown, but it was thought to be some variety of cyst.

The patient was given several deep therapy x-ray treatments at the Steiner Clinic, of this city, without any change in the size, shape or density of this tumor. There was no change in her clinical condition following this radiation.

The patient died November 12, 1929. The family refused a post mortem study.

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DISCUSSION (*Abstract*)

Dr. Robert Drane, Savannah, Ga.—I recently examined a negro, a healthy, hard working stevedore, a giant in size, with an enormous hand, and definite clubbing of the fingers and toes. He had an exaggerated lipping, and very slight periosteal changes; he had no changes in his skull. He has no frontal sinuses at all. His chest and heart were normal. This was a case of hypertrophic osteo-arthropathy, and not acromegaly.

Dr. J. M. Martin, Dallas, Tex.—I should like to hear you express yourselves regarding the probable cause of the hypertrophic changes often seen on the edges of the vertebrae. I notice that some modern authors are still repeating the old idea that trauma is a factor in their production. Those who do a considerable amount of medico-legal practice are frequently asked about this condition. Personally, I doubt that such changes are in any way caused by trauma.

Dr. R. T. Wilson, Temple, Tex.—I have seen two or three cases of tumors of the lung like Dr. Clark's, but I did not connect them with the skeleton.

Dr. F. K. Herpel, West Palm Beach, Fla.—I have made it a routine practice in injuries to the spine, where osteo-arthritic spurs are found, to take stereoscopic roentgenograms. I have demonstrated in a number of patients fracture through an osteo-arthritic spur. It appears to me that the patient, though he may have a definite osteo-arthritic condition, not due to the immediate injury or trauma, should be protected in his disability by determining whether there may or may not have been a fracture through an arthritic spur.

Dr. Alfred L. Gray, Richmond, Va.—I want to mention a point that may attract attention to this condition, and that is a sensation of numbness in the fingers, without pain. I think I have been able to make a clinical diagnosis very early by reason of the little numbness that occurs in these cases.

Dr. J. C. Dickinson, Tampa, Fla.—Patients with arthritic changes are the victims of very trivial injuries. Many patients with arthritic joints or spine have an injury that might be of small concern, yet it is the public service corporation or railroad company's misfortune to have such a person as a passenger. They are responsible for the disability. It is a most unfair situation.

I wonder whether Dr. Clark, in closing, will tell us why this patient died, what happened to her, and the course of her illness up to the time of death?

Dr. J. W. Pierson, Baltimore, Md.—We are all familiar with the periosteal changes associated with chronic pulmonary lesions, which are produced in bones. Dr. Clark answered Dr. Martin's question regarding the differentiation of these lesions from the thickening of the periosteum produced by trauma, when he stated that the periosteum is widely separated from the cortex of the bone in cases of secondary hypertrophic osteo-arthropathy. Trauma sometimes produces a thickening of the periosteum, but it never causes a distinct separation of the periosteum such as is seen in cases of the type under discussion. The only other disease that presents a picture which could possibly be mistaken for hypertrophic osteo-arthropathy is rickets. When the process of repair has begun in that disease, the periosteum appears to be, though it actually is not, elevated from the bone. The characteristic changes produced in the epiphyses and ends of the diaphyses of the bones by rickets would serve to differentiate the two lesions.

Dr. Clark (closing).—As radiologists, I do not believe we need to have the chest called to our attention when we encounter cases which present clubbing of the fingers as an important symptom.

I was impressed with the large number of physicians who had examined this case without suspecting a pulmonary lesion. For this reason, and because radiation of the pulmonary tumor had no appreciable effect on her bone changes I have reported it.

The patient developed a gradual secondary anemia and finally died. We were unable to get a post mortem so that the identity of the tumor is still unknown.

I do not feel able to express myself as to the cause of these advanced periosteal and bone changes.

CONGENITAL ELEPHANTIASIS*

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Congenital elephantiasis occurs with such rarity that the case here presented is of interest. Pediatric and pathological tests seldom mention this condition. The first case of congenital elephantiasis recorded in the literature was by Veit[1] in 1852. The first instance appearing in American literature was that of Jacobi[2] in 1872. In 1925, Ruh[3] made a comprehensive search of the literature and was enabled thereby to find but eleven cases of true congenital elephantiasis. Survey of foreign and American literature since that time has yielded eleven additional instances. To this sum of but 22 cases is added the present one, making a total of 23.

CASE REPORT

W. B., a girl, age 16, was admitted to Baylor Hospital on August 11, 1929 (*Figures 1* and *2*). She was born normally, at full term. Immediately after birth it was noticed that the lower right extremity was considerably larger than the left. Otherwise the infant appeared normal. During the next two years this extremity continued to enlarge and the child was brought to Dallas, where a modified Kondolean operation was performed. The surgical treatment afforded little relief. The extremity progressively increased in size, although the child's development was perfectly normal otherwise. No inflammation nor pain had been present at any time and the child had used the extremity until July of this year. At this time a painful ulceration on the dorsum of the foot developed and she was confined to bed, with the leg elevated, until her entrance into Baylor Hospital in August. The family history was entirely negative. The father and mother were native Texans, never having been out of this country. She was one of a large family of children. Her brothers and sisters were all living and well. There had been no miscarriages. The child's history of past illnesses was uneventful.

Examination revealed a mentally alert, well nourished girl with a striking enlargement of the right lower extremity. The affected limb appeared to be nearly twice the size of its fellow. The foot was much swollen, the skin being thrown into folds over the dorsum. Gangrenous ulcerations with a foul odor were present at the base of the second toe and on the lateral aspect of the foot. The skin was bronzed in color and so sclerotic over the entire surface that it could not be pitted by digital pressure. Papillary horny growths were scattered over the thigh and leg. The swelling

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Fig. 1

Fig. 2

and induration extended up to Poupart's ligament. Pain could be elicited only at the site of the ulceration. The right labia minor was hypertrophied. Otherwise the physical examination revealed the child to be perfectly normal in appearance and development. The temperature, pulse rate and respiration were normal.

Laboratory examinations, including Wassermann, von Pirquet, blood chemistry studies, complete blood and urinalysis were negative.

Because of the gangrenous condition of the foot an amputation of the extremity was deemed necessary. The cut surface showed an extraordinary outpouring of clear fluid. The bone and muscle tissues were of average appearance. The subcutaneous and fatty tissues were markedly thickened, average 3.5 cm. in thickness. Marked edema was noted of the subcutaneous tissue. Microscopically the skin was thickened with accentuation of the papillae. Marked hypertrophy of the subcutaneous tissue was present, in which were numerous dilated lymph spaces containing serum. In the subcutaneous tissue there were lymphocytes and neutrophils. Infiltration was present around the veins, the fatty tissue was increased. Section of the muscles showed degeneration with loss of striations and separation of fibers with fragmentation.

ETIOLOGY

Congenital elephantiasis is a progressive condition, characterized by fibromatosis or hypertrophy of the dermal and hypodermal connective tissue, associated with lymphatic and venous stasis. Elephantiasic edema is usually considered as being filarial or non-filarial. The filarial type is endemic in tropical and sub-tropical zones, attacking natives principally.[5] Congenital elephantiasis bears no relation to the tropical disease; a review of the literature has failed to reveal any of this type affecting children in this country or elsewhere. The etiology of the non-filarial or congenital type is most obscure. It is presumably caused by a mechanical obstruction; anything that causes venous and lymph stasis predisposes to development of elephantiasis.

Elterich[4] and Mahon[6] have isolated streptococci from cases of elephantiasis, but efforts to reproduce the affliction by Mahon, in dogs, by lymph blockage and injection of the streptococci failed. Prout[7] considers elephantiasis to be a subacute or chronic recurring erysipelas. Webb[8] and Klotz[9] have suggested syphilis as a causative factor. Matas[10] considers tuberculous and carcinomatous masses as factors producing

Fig. 3

Boy, age 6, of Italian parentage. He was one of thirteen children, two brothers having died during infancy from unknown causes. The family history was negative for syphilis, tuberculosis and alcoholism. The previous history of the patient was good, he had had no infectious diseases. At birth there was a marked swelling of the right leg, which progressively enlarged up to the age of six. The patient was fairly well nourished with a striking enlargement of the right lower extremity. The foot was very swollen with a pad-like tumor over the dorsum. The skin was indurated. No pain was present. The thickened skin and swelling extended up to the thigh. Reported by Elterich.4

the mechanical obstruction. Ritter von Reuss[11] states in his pathological text that some forms are probably caused by congestion that follows intra-uterine constriction of amniotic bands. In other cases there is, he believes, simple hyperplasia of the connective tissue, due to some morbid predisposition or inherent tissue defect. This view is supported by the occurrence of elephantiasis in families; Jopson[12] reported elephantiasis in two children of one family whose father suffered from the same condition. Instances are reported of twins, both of whom were afflicted with this malady.[13] Ruh,[14] who has made a diligent study of congenital elephantiasis, states that reference to the embryology of the lymphatic system throws little light on the nature of the factors cooperating in the production of lymphangiectasis and the associated overgrowth of connective tissue. The lymphatic vessels and

Fig. 4

Girl, age 6 weeks, of American parentage. The family history was negative. The third child; birth normal. At the time of delivery the left limb was noted to have the abnormal development seen in the illustration, the extremity being nearly three times as large as the right. With the exception of the lower extremity, the infant was perfectly normal in appearance. The skin was not discolored, but so sclerotic that it would not pit under pressure. The swelling and induration extended up to the hip. Reported by Elterich.4

Fig. 5

Six-month-old infant with congenital elephantiasis reported by Dr. J. T. Carter.[22] The family history was negative, the parents were Texans. There were nine children in the family, two of whom had died; one of typhoid fever, the other from colitis.

At birth there was a decided enlargement of the right arm, hand and digits. During the following six months there was a progressive, painless swelling of this extremity. The infant's development was entirely normal otherwise. The induration of the skin and the swelling extended up to the shoulder. The last report indicated that the enlargement was progressing.

connective tissue are derived from the mesoderm and he believes that some developmental defect in this layer is responsible for the condition.

All observers agree that lymph stasis is prerequisite in the causation of elephantiasis and it is most likely that the bacteria noted in individual cases are merely secondary invaders. No positive opinion can be found in text-books or the literature as to the etiological factors causing elephantiasis, although many theories are advanced and certain conclusions drawn from clinical and pathological evidence.

TREATMENT

The prognosis is unfavorable for recovery, the condition being in reality a malformation. Medical treatment is valueless; surgical intervention is but palliative; permanent cure is impossible. Only a few instances are described by Elterich[4] and Castellani[15] where children have received palliative surgical treatment for elephantiasis. The success of these operations cannot be ascertained because of lack of follow-up reports. The operative procedure used was that of Kondoleon,[16] which is removal of sections of subcutaneous tissue by means of which partial adequate connection between the deep and superficial lymphatics is hoped to be established. Modifications of the Kondoleon operation have been proposed by Lanz,[17] Oppel,[18] Rosanow,[19] Matas[5] and Sistrunk,[20] the principle of which, however, appears to be essentially the same. Bandaging of the affected limb has been tried with little success. Recently, Carvallo[21] noted an improvement in a patient with elephantiasis following parietal sympathectomy.

SUMMARY

Congenital elephantiasic edema is an exceedingly rare disease, characterized by dilated lymph channels, lymphedema and hypertrophied connective tissue, usually affecting the lower extremity. The etiology of this condition is obscure, probably due to some inherent tissue defect. The disease pursues a painless progressive course with little impairment of the general health. The diagnosis is easily established by the history and by exclusion of other factors causing edema. Medical treatment is of no value. Surgical cure by present methods is impossible.

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Southwest Clinic.

A STUDY OF THE RARE HUMAN TAPEWORM, TAENIA CONFUSA, WITH A REPORT OF THE FOURTH CASE*

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On March 10, 1929, segments of a tapeworm from the stool of a patient in Charity Hospital, New Orleans, were referred to the writer for diagnosis. They resembled somewhat the terminal segments of *Taenia saginata,* but differed in being longer and narrower, and on compression between two glass slides were found to be more characteristic of those described for *T. confusa* by Ward, in 1896. Following administration of oleoresin of male fern the entire worm, including the head, was passed, and, through the courtesy of Dr. P. H. Jones, was brought to the writer for study. Examination of the complete worm in a living condition not only confirmed the preliminary diagnosis, but provided certain specific information which added to the previous facts concerning this species. Furthermore, since diagnosis was made while the worm was still alive, opportunity was afforded for feeding experiments to determine the intermediate host.

PRESENTATION OF DATA

The entire living worm measured 495.5 cm. in length and consisted of 581 segments, an unsegmented length of about 5 mm. in the cervical region and a scolex. In the relaxed condition all of the segments were longer than wide, but in the fixed specimen contracted segments in the second fifth of the body were definitely broader than long. The terminal segments, which were similar to those passed separately in the stool preceding treatment, measured about 35 mm. in length by 3.5 to 5 mm. in width, while the maturing segments had a length measurement of about 10 mm. and a breadth of about 6 mm. In the living worm the scolex was oval in shape, measuring 1.5 mm. in breadth by 1.0 mm. in length and 1.2 mm. in thickness (*Figs. 1, 2*). It had a slight terminal depression, four symmetrically placed conspicuous suckers, one for each quadrant, and was slightly pigmented on its proximal aspect. The cervical region was conspicuously constricted immediately behind the scolex and for a length of about 3 mm. had parallel sides which were 0.3 mm. apart. For this same length there was a pair of delicate marginal elytra, which, at their greatest breadth had a measurement of 0.3 mm. each. In the fixed specimen these elytra were difficult to see.

The distal segments of this worm, as well as those which had become separated from the strobila, differed in gross appearance from similar ones of *Taenia saginata* only in being longer and narrower. Under pressure, however, they showed the heavier uterine branches as described by Guyer (1898) for *T. confusa* (*Fig. 3*). When the eggs were dissected out of the uterus they were seen to be enveloped with an embryonic membrane which measured 54-62 by 70-72 *mu,* and which was similar to that of *T. saginata* eggs but appeared to be much more delicate (*Fig. 4*). The egg itself is spheroidal to oval (*Figs. 5, 6*), and has a very thick wall traversed with minute radial channels, which give a surface appearance of delicate pitting. It measures 31-35 by 36-45 *mu.* The embryo within, which averages 23 by 33 *mu* in size, contains three pairs of characteristic teniid hooklets. On expressing the hexacanth larva from its shell (*Fig. 7*) there were observed several cells which were arranged in such a manner as to suggest a post-gastrula stage of development. At times a pair of flame cells was also seen (*Fig. 8*). Splitting of the uterus along the mid-ventral line of the segment to allow discharge of the eggs appeared to be less common than disintegration of the entire segment.

Information obtained from the patient through her family physician, Dr. J. E. Clayton, indicated that she was a native of St. John Parish, about 50 miles up the river from New Orleans; that she had harbored the tapeworm for at least eleven years, during which time she had been previously treated twice for the infection, but without success; that she had consumed beef, pork, deer, rabbit, chicken and fish flesh from time to time and had often tasted raw meat, particularly beef, in fact, "preferred it that way." In view of the pre- and post-treatment findings none of the symptoms of which she complained could be definitely attributed to the worm.

In order to test out the hypothesis that cattle were probably the intermediate hosts of this parasite, a two-weeks old suckling calf from within the city limits of New Orleans was procured and on March 15, 1929, was fed the eggs from six distal segments of the adult worm, macerated in a mortar. For the first month the calf was fed only on pasteurized cow's milk, but later a milk and bran diet was introduced. Likewise a laboratory-bred rabbit was fed a similar amount of *T. confusa* eggs and kept on a bal-

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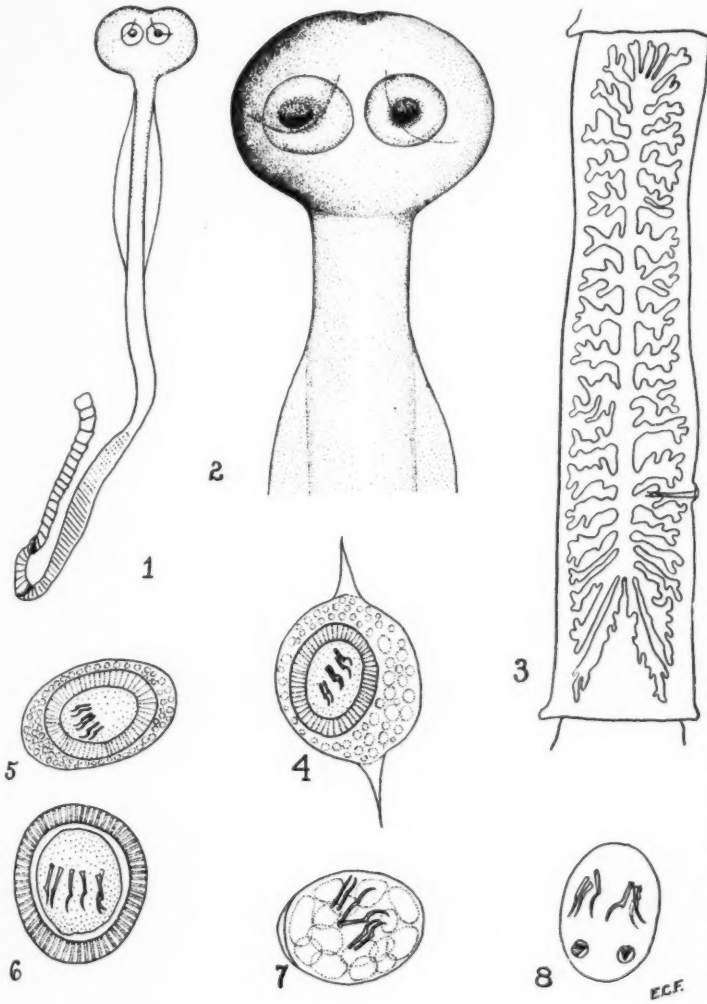

Plate 1

Fig. 1. Scolex, neck and proximal segmented portion of strobila of *Taenia confusa* (X 10½).
Fig. 2. Scolex and adjacent region of neck of *T. confusa* (X 36).
Fig. 3. Ripe distal segment of *T. confusa*, showing uterine pattern (X 3).
Figs. 4, 5. Eggs of *T. confusa* within embryonic membrane (X 375).
Fig. 6. Egg of *T. confusa* recovered from the patient's stool (X 675).
Figs. 7, 8. Onchosphere of *T. confusa* expressed from the egg shell; (7) showing advanced segmentation of embryo; (8) showing a pair of flame cells (X 675).

anced diet. The calf and the rabbit were autopsied on June 25, 1929, with the following findings:

(1) *Calf.*—After having been bled to death, the skin was reflected off the body from the mid-ventral line. All organs and muscle layers throughout the body were found to be infested with cysticerci, which resembled those of *Taenia saginata* in lacking a crown of hooklets around the rostellum, but were appreciably smaller. The somatic musculature of the host was most heavily parasitized in the region of the neck, particularly the trapezius muscle. The under side of the tongue was also heavily infested. A few cysticerci were found in the heart muscle, in the depth of the liver and on the surface of the kidneys, and one in the tissue of the left lung. The spleen and pancreas were unparasitized. The brain was not examined. Altogether, more than one thousand cysticerci were recovered. The majority of these larvae were viable, but a few larvae were undergoing caseation. There was no evidence of calcification.

(2) *Rabbit.* — After death produced under anesthesia, the skin was reflected off the body and all organs and tissues were carefully examined. The heart, tongue, muscles of the neck, back, and so forth, all proved to be unparasitized. Three cysticerci were found at the pyloric end of the stomach, attached to the peritoneum. Under the microscope each was found to have a distinct crown of hooklets and was identified as *Cysticercus pisiformis,* a natural infection of the rabbit in Louisiana. No cysticerci without hooklets were found.

The cysticerci from the calf were first observed in the tissues as small oval opalescent bodies, surrounded by a thin adventitious capsule. They measured 4-6 mm. by 3-4 mm. in greater and lesser diameters. On dissection out of the capsule each one was found to have on one side a more opaque milky center, which was seen under the microscope to be the place where the head was invaginated into the bladder (*Fig. 9*). These cysticerci contained in the wall large numbers of minute calcic granules, which were most numerous at the point of invagination (*Fig. 10*). The bladder wall was provided with two series of muscles, meridional and circular. Throughout the entire wall there were anastomosing canals which proved to be the excretory tubules (*Figs. 12, 13*). These were most delicate and plentiful on the side opposite the invagination, while

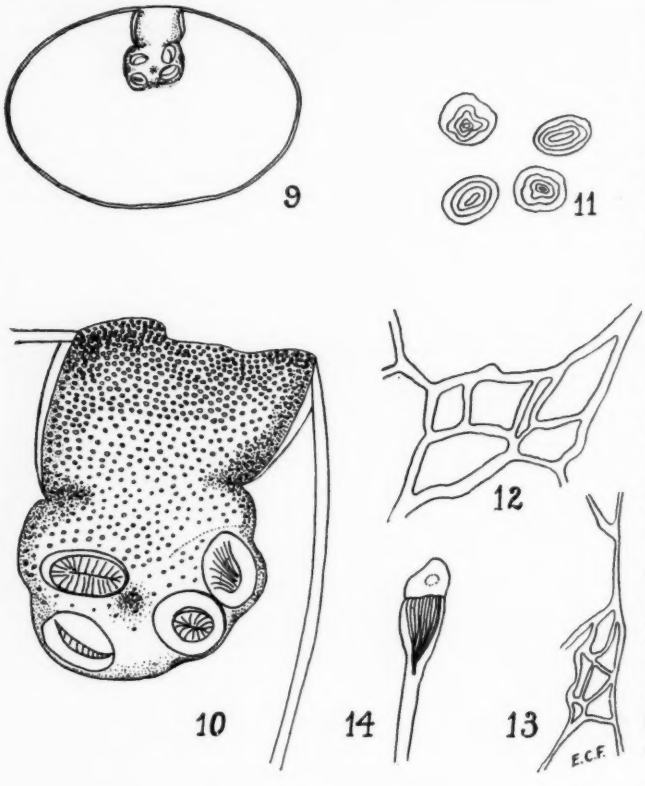

Plate 2

Fig. 9. Optical view through the compressed cysticercus of *T. confusa*, showing invaginated scolex and neck (X 9).
Fig. 10. Scolex and neck region of the cysticercus of *T. confusa*, under pressure, showing distribution of calcic granules. Greatly enlarged.
Fig. 11. Typical calcic granules from the cysticercus of *T. confusa*.
Figs. 12, 13. Anastomosing excretory vessels in bladder wall of the cysticercus of *T. confusa*.
Fig. 14. Terminal flame cell in excretory system of the cysticercus of *T. confusa*.

in the "neck" region they were few and of large diameter. These canals were, furthermore, found to consist of three layers, (1) an outermost region, just under the muscular layers, composed of relatively large tubules, (2) a median layer of smaller sized ones, and (3) an inner layer next to the inner wall of the bladder, consisting of capillaries with terminal flame cells. These flame cells, (*Fig. 14*) the "protonephridia" of the excretory system, were found in thousands throughout the bladder wall. They were much larger than the capillaries with which they were connected and were seen to be beating very rapidly.

The invaginated portion of the larva consisted of a short, hollow, tubular "neck" region and a scolex with a solid core. The latter was characterized by having four distinct suctorial pockets and a median proximal depression. The scolex and its suckers displayed considerable movement, but in no case was pressure under the cover-glass able to produce evagination.

The miliary infection with these cysticerci, having scolices resembling those of *Taenia confusa*, in a calf under control, infected experimentally with embryonated eggs from *Taenia confusa*, leaves little room for doubt that these larvae are the cysticercus stage of *T. confusa* and that the calf is at least an acceptable host for the larval stage of this tapeworm. This belief is also substantiated by the information elicited from the patient (*vide supra*). On the other hand the experimental evidence indicates that the rabbit is not an appropriate host for this cysticercus.

Some of the viable cysticerci from the calf were fed to two Macacus monkeys, but up to four months following the feeding there was no evidence that any development had taken place. Within the following month, however, proglotteds of *Taenia confusa* were recovered in small numbers from one of the two monkeys, following a sodium sulphate purge.

CASE HISTORY OF MRS. W. V., CHARITY HOSPITAL, NEW ORLEANS

The patient was a white married woman, age 34, who resided in Garyville, St. John Parish, Louisiana.

She was a rural housewife, living in extreme poverty. She and five children lived and slept in one room of a three room house.

She was admitted to Charity Hospital, Surgical Service, February 28, 1929, transferred to the Medical Service, March 8, 1929, and discharged March 12, 1929.

The tentative diagnosis was chronic appendicitis; intestinal parasites; right cystic oophoritis; slightly lacerated and cystic cervix, and posterior pulmonary phthisis(?).

For the preceding three years the patient had suffered pain in the lower right abdomen. It was described as a hard pain which remained localized. Attacks came on about every two months and lasted varying lengths of time, seeming to increase in duration as time went on. The first attack, three years before, lasted only three minutes. The attacks now last for two days. The pain is constant during the attack, some relief being afforded by cold applications to the side. During an attack, the patient vomits everything taken by mouth. This occurs within five minutes after the taking of food. As a result, she suffers a loss of appetite. Between attacks, the appetite is excellent and there are no gastric

disturbances. The pain is not associated with the intake of food.

The patient states that she has been passing tapeworm segments for the past eleven years. This occurs with nearly every defecation and is still occurring at the present time. She has previously taken treatment twice, passing the greater portion of the worm each time, but not its head. She estimates that she has lost about ten pounds during this present attack.

She has a headache of frontal character about once a week. During the past week she has noticed a slight swelling in the feet.

She is up and about the ward, not appearing ill. The head is normal, except that the tonsils are slightly enlarged. In the neck the glands are slightly enlarged. The lungs are normal (?). The heart is normal. The abdominal wall is very lax and soft. Over McBurney's area there is some definite tenderness and rigidity. There is none elsewhere.

March 2, 1929, the history was taken and physical examination made.

March 4, vaginal examination showed the right ovary slightly enlarged, prolapsed and cystic.

March 3, fecal examination was negative.

March 7, fecal examination was positive for tenia ova and segments. Four segments were found. The interne observed that "they did not look like ordinary *Taenia saginata* segments."

March 8, patient was transferred from the Surgical to the Medical Ward.

March 11, 6 c. c. oleoresin male fern were given, 2 c. c. at 15 minute intervals, followed thirty minutes after the last dose by a magnesium sulphate purge.

At 9:00 a. m., therapeusis was started.

At 10:00 a. m., she was given a magnesium sulphate purge.

At 4:00 p. m., the worm was passed.

The fever chart was normal.

The blood picture was not taken.

The urine was normal except for epithelial cells in fairly large quantity.

The blood pressure was 128/90.

The patient was discharged on the evening of March 12, 1929.

She was readmitted to Charity Hospital September 5, 1929, as a pregnancy case. Fecal examination covering a period of twenty-two days, and five specimens, showed infection with *Endamoeba histolytica, E. coli, Endolimax nana,* chilomastix, trichomonas and strongyloides, but was negative for tenia eggs or segments.

The first two cases of *Taenia confusa* were described from Lincoln, Nebraska (Ward, 1896; Guyer, 1898). The third case, that of a patient in the Texas Medical School Hospital, and presumably a native of Texas, was described by Chandler (1920) twenty-five years after the Nebraska cases were reported. After another period of nine years the Louisiana case is now discovered. The writer agrees with Chandler (l. c. p. 34) in believing that there is "a strong probability that the worm has existed throughout this time in the southern part of the middle western portion of the United States in sufficient numbers to protect it against extermination," while the scarcity of known cases is the result of confusing this species with *Taenia saginata*. Furthermore, the Louisiana case extends the distribution more definitely into the Gulf littoral.

In one of the Nebraska specimens, carelessness of a technician apparently caused the loss of the original scolex. In the other specimen the scolex was not available for study. Chandler's worm was, therefore, the first for which an unchallenged description of the scolex was provided. The good fortune which made it possible to study the Louisiana specimen in the living condition has not only confirmed Chandler's description, but has added valuable criteria for differentiating this species and has made it possible to determine with considerable certainty its whole life cycle.

The present study affords no new evidence relative to the identity of *Taenia confusa* and *T. bremneri* (Stephens, 1908), but the shape of the distal segments and the branching of the uteri in the two forms are highly suggestive of this conclusion. Moreover, the differences in length and breadth between the living and fixed examples of the terminal segments of the Louisiana specimen indicate that a marked variation in macroscopic appearance may obtain. A study of this latter material has shown that there is adequate evidence for retaining *Taenia confusa* as a separate and distinct species of the *T. saginata* type (subgenus *Taeniarhynchus*), in which the scolex is unarmed and in which the embryonic membrane is provided with polar projections.

SUMMARY

(1) A case of *Taenia confusa* of more than eleven years standing is reported from a native white woman from Louisiana. This constitutes the fourth known infection with this tapeworm.

(2) The worm is described and additional data are provided for differentiating this species. Its relationship to *T. saginata* is of subgeneric rather than specific value.

(3) The case history evidence, suggesting raw beef as a source of infection, is confirmed by experimental feeding of a suckling calf, in which a miliary infection of cysticerci of an "unarmed" tenia was observed three months after feeding.

(4) The cysticercus is described in detail.

(5) The writer concurs in Chandler's view (1920) that the cases of this infection are considerably more numerous than the few reports

indicate, since this would be necessary in order to perpetuate the species. The identity of *T. confusa* and *T. bremneri* is highly probable.

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DISCUSSION (*Abstract*)

Dr. Henry E. Meleney, Nashville, Tenn.—Dr. Faust has described distinguishing features in the anatomical structure of the worm which were unknown, particularly the elytra on the neck. He has gone beyond morphology and settled the transmission of the parasite, which from the point of view of prevention and the public health is more important than the morphology itself.

Too often in our examinations of parasites we do the work with fixed specimens. It is certainly important to observe such specimens during life, in order to study their true morphology. The contraction of segments in a worm like this, especially the terminal segments, may give entirely different proportions and measurements from those which are present in life, and make it difficult to identify the worm. Fixation also may hide important structures such as the elytra, which may be valuable for differentiation. I believe that by careful observation in the future we may find that this parasite is not uncommon in the southern United States.

Dr. Foster M. Johns, New Orleans, La.—Dr. Faust seems to have the hooklets drawn very boldly. We have many cases in which the hooklets are very striking in our stool preparations and others in which they are hardly noticeable. I would like to know whether he ascribed any differential diagnostic importance to this feature, in *Taenia saginata* and *Taenia solium?*

Dr. Faust (closing).—It is quite probable that the distribution of *Taenia confusa* is much more widespread than has been thought, or has been assumed, from the fact that previously only three cases have been described, two from Nebraska and one from Texas. Now, we have the fourth case from Louisiana. The very fact that these have been found over a period of thirty years indicates that we must have had a much larger number of cases to carry on the life cycle of the species. So, apparently there is a much larger number of these forms present than the few records indicate. Of course, knowing that the beef is the intermediate host simplifies the prevention problem, because the same sort of preventive measures apply to this form that apply to the beef tapeworm.

I also want to stress the point that Dr. Meleney has made, that it is much more valuable in cases of this kind to make careful examinations of the fresh material than to preserve it and study it months or years afterward, though it is well to preserve specimens as a control. Tapeworms, in particular, harden after having been in alcohol for a number of years, and it is hard to study them.

Dr. Johns mentioned the point of differential diagnosis of the eggs. Undoubtedly the eggs in which the hooklets are difficult to find or very sketchy in appearance are those which are not quite mature. The hooklets appear only when the embryo is fully mature. As far as I know, in all of the tenia eggs there is no differentiation that can be based on the size or boldness or lightness of the hooklets. The difference between boldness and sketchiness in the hooklets is one of maturity and not of specific infection.

ACTINOMYCOSIS (MYCETOMA): REPORT OF SIX CASES IN GEORGIA*

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By the term *actinomycosis,* we mean an endemic disease of man and animals, which is a slowly progressive, chronic infectious granuloma, caused by various fungi of different genera and species, presenting clinically, nodular hypertrophies of the infected tissue, and frequently draining sinuses. Castellani and Chalmers,[1] Chalmers and Archibald,[2] and other authors, use the term *mycetoma* to describe all growths and granulations which produce enlargement, deformity or destruction in any part of the tissues of man or animals, caused by fungi belonging to different genera and species. Thus, the terms *actinomycosis* and *mycetoma* are synonymous.

The word *actinomycosis* was coined by Bollinger and Harz,[3] in 1877, to describe a disease of cattle, commonly known by the term *lumpy jaw.* This disease had been described by LaBlanc,[4] in 1826, and referred to by several authors, but no mention had been made of the causative organism. Bollinger, examining the pus from the diseased tissue, discovered many small yellow grains (granum). In these grains or granules he discovered masses of filaments with clubbed ends, radiating from a central nucleus, which he concluded were fungi. The aster-like appearance of the fungus led to the use of the term *ray-fungus* or its Greek counterpart *actinomycete.* This term later was borrowed by Israel[5] and Ponfick[6] to name a similar disease in man, the former describing a human infection and the latter showing the similarity between the human and bovine types.

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*From the Department of Dermatology, Emory University Medical School.

However, some twenty years before Bollinger and Harz wrote of sulphur granules and the ray fungus, Ballingall[1] (1855) and Rustomji[1] had described a disease of India known as Madura foot, and had found granules in the fluid discharges of this disease. Ballingall described the radiating character of a fungus in these granules. Between the years 1860 and 1874 Van Dyck Carter[7] wrote a series of classical papers on Madura foot, in which he gave the disease the name of mycetoma, and, finally, was able to establish its fungal nature. It was not until the last few years that the medical profession realized that all these fungal tumors presented the same tissue response, although they are caused by various species of fungi.

Van Dyck Carter's attempt at artificial cultivation of the fungi was futile, and it was not until 1888 that the cultural characteristics of an actinomycete were reported. In this year Nocard[8] isolated a filamentous fungus which grew aerobically, from a tuberculous disease of cattle known as *farcin des bouefs*. A few years later (1892) Boestrom[9] grew a similar fungus from a series of cases of human actinomycosis, and, in 1893, Wolff and Israel reported the cultivation of an entirely different fungus isolated from similar cases. The latter fungus had larger mycelial filaments and grew anaerobically. In 1894, Vincent[10] reported the characteristics of the *streptothrix Madurae* cultivated from a Madura foot. This fungus was later found to be the same as Nocard's fungus. Since this a large number of widely varying fungi have been cultivated and reported, each author naming his fungus differently. Many authors have not appreciated the fact that the terms *actinomyces, cladothrix, streptothrix, nocardia,* and so forth, are synonymous, and thus the literature is as confusing as it is extensive.

The confusion has been somewhat simplified by the classification of the fungi by Pinnoy,[11] Brumpt,[12] and Castellani and Chalmers.[1]

These authors, with a slight variation among themselves, divide the fungi causing mycetoma into the two large families of the *actinomycoses* and the *maduromycoses*. The actinomycoses are classified under the Nocardiaceae, hyphomycetic fungi, made up of thin bacilliform and non-separate filament without chlamydospores. The *Nocardia bovis* and the *Chonistreptothrix* are the only families of the Nocardiaceae. The maduromycoses are made up of a number of organisms found in the families of Aspergillaceae, Allescheria, Scedosporia, Glenosporia, penicillium, and sterigmatocystis. They are hyphomycetes made up of thick mycelial filaments with chlamydospores. Fungi of the type of leptothrix may also cause actinomycosis. Cases of actinomycosis have been frequently observed in which no fungal masses have been found, but in which filaments of mycelia have occurred in the tissues, and cultures have demonstrated the presence of any of the above mentioned fungi. Chalmers and Archibald[2] (1917) proposed the name *paramycetoma* for these cases, and have included them under the general term, *mycetoma*.

The manner in which the fungus enters the human host is not definitely known. Boestrom,[9] Saltman,[13] Cope,[14] Habshmann[15] and others have found foreign bodies in the fungal tumor surrounded by the fungus. Many of the causative fungi have been found widely distributed in nature on thorns, splinters and elsewhere. Lord[16] was able to demonstrate an actinomycetic fungus in the tonsillar crypts and in various teeth and it is probable that it is through these areas, especially the latter, that the fungus enters the neck. The habit of chewing straws and splinters probably deposits the fungi in accessible areas.

After gaining entrance to the tissues, the fungus grows slowly,* but persistently, extending mycelial filaments into the surrounding tissue. The connective tissue response is marked and much new tissue is formed far from the invading organism, producing the board-like tumefaction characteristic of the disease. Giant cells and eosinophil bodies are formed and the pathological picture is that of the infectious granulomas, not unlike that of tuberculosis. Sooner or later necrosis of the tissues produces abscess cavities, containing the fungus or its spores. The fungus growing in this unfavorable liquid medium produces a conglomerate mass of filaments radiating from a central nucleus, thus forming the characteristic grains, or granules. The fungus also grows in filaments on the walls of these cavities and in the surrounding inflammatory tumor.

The disease actinomycosis probably occurs more commonly than one is led to believe. The paucity of the reports in the literature seems to have kept alive the idea that actinomycosis is a rare disease in the United States. Sanford,[19] in 1923, was able to collect data on nearly 700 cases of actinomycosis that had occurred within the bounds of the United States. Some of these cases were unpublished and unreported, and it is probable that there are other cases buried in the literature which could be classified from the description of the unusual organism found. Sanford found that the great majority of cases had

*If Kemper and Jameson's[17] case was a true mycetoma, the growth may be rapid. This is supported by Musgrave and Clegg's[18] inoculation experiments on monkeys, in which the swelling occurred within twelve to sixteen days, and was quickly followed by suppuration.

been reported from the sections surrounding Chicago, Rochester, Boston, New York and Baltimore, and that less than fifteen cases had been reported from any state in the South. Bassoe, in the discussion of Sanford's thesis, remarks that the map really represents the sections of the United States where the most thorough work is done.

With the exception of one case[20] of mycetoma of the foot, we have been unable to find any cases of human actinomycosis reported as occurring in the state of Georgia. The following cases coming under our notice within a period of a few months bring to mind the supposition that many similar cases have been overlooked, and that probably actinomycosis is far more common in the state of Georgia than is generally thought.

Case 1.—Mrs. T., a white American housewife, aged 70, was seen in December, 1928, complaining of painful tumors and draining sinuses in the neck and right axilla.

In 1924, she had complained of an indefinite abdominal pain and a laparotomy was performed on April 3. The walls of the sigmoid colon were very much thickened, apparently encroaching on the lumen, and the appendix was thickened in its terminal third, where a concretion could be felt. Resection of the colon and an appendectomy were performed. The tumor was considered a benign hypertrophy.

In January, 1925, she complained of a swollen gland in the left side of the neck. A lymph node was found the size of a hen's egg, soft and tender. Hot compresses and treatment of her teeth and throat reduced the node to the size of a bean, but in April the swelling recurred. The same treatment succeeded in relieving the condition again. In February, 1926, the swelling again recurred and after six weeks' treatment abscessed and drained thick, yellow pus. The sinus never healed and the patient ran an afternoon temperature of 99-99.6°. From April until August, 1926, she received old tuberculin almost every day with no appreciable improvement, and in August, following a stormy reaction to x-ray treatment, a node back of the sinus enlarged and abscessed. In September, 1926, the old sinus, two enlarged glands, and the ruptured abscessed gland were removed surgically. The incision healed by first intention in two weeks, but the third week after operation two swollen areas appeared under the chin. She continued to run a slight temperature in the evening. In December, she developed a general infection. There was marked thickening and brawny induration of the skin and subcutaneous tissues of both sides of the neck and for two weeks the temperature reached 102 to 104° daily. From December, 1926, until May, 1927, several swollen and inflamed areas appeared on both sides of the neck and just above the left clavicle, which abscessed and left draining sinuses. From June, 1927, until January, 1928, still more inflamed areas appeared in the neck and on the shoulders. These formed abscesses and were drained. In November, a mass appeared in the right axilla, and she was given metaphen and mercurochrome intravenously. During these seven months the temperature varied from 99 to 103°. In January, 1928, the whole condition flared up, and all the sinuses drained profusely. She was seen in consultation by one of us for an erythema nodosum on the lower limbs. The diagnosis of actinomycosis was suggested at this time and she was given five drops of a saturated solution of potassium iodide three times a day, increasing one drop a dose. This was discontinued at the dose of forty drops three times a day, because of abscesses of the eyelids. The condition steadily progressed, and the temperature ran from 101 to 103° daily. From May until December, 1928, she was given 22 doses of sulpharsphenamine, 19 doses of neo-arsphenamine and eleven doses of bismuth salicylate. The temperature gradually came down to 99-101° and the patient felt better.

Examination.—The patient was a well developed, but poorly nourished middle-aged woman, who appeared ill. Her face had a bloated appearance. The general physical examination was negative, except for slight dental caries and pyorrhea, enlarged tonsils and a slight arteriosclerosis. The skin with the exception of the neck and right axilla was normal. The left side of the neck from the clavicle to the jaw bone was irregularly swollen and studded with transverse incision scars and draining sinuses. There were fewer mouth-like draining sinuses on the right side of the neck, but many were distributed above and below the right clavicle in the right axilla. There were two soft fluctuating tumors in the right axilla. There was only a slight induration around the sinuses amounting to hardly more than edema and thickening of the subcutaneous tissues, but there was extreme tenderness. The temperature at that time was varying from 99 to 101°. Urinalysis persistently showed a trace of albumin but no casts. The red and white blood cell counts were normal, and the blood Wassermann was negative. When one of the fluctuant areas in the axilla was incised, a large amount of thick, yellow pus containing no granules was obtained. Curettings taken from the walls of the abscess cavity had a gelatin-like appearance. When placed under the microscope this gelatin-like substance seemed to be made up of closely packed and intertwined masses of mycelial threads. Small portions of the curettings were cultivated, both anaerobically and aerobically, but we were unable to obtain any growth. Sir Aldo Castellani, taking cultures, obtained a very sparse anaerobic growth of the Chonistreptothrix israeli.

Clinical Course.—The patient was immediately placed on large and increasing doses of potassium iodide, alternated weekly with sulpharsphenamine. The iodides were not tolerated well and she never took more than 400 drops a day at any one time. The fourth week after the beginning of treatment, she passed into a comatose state, with marked dyspnea and cyanosis. This was interpreted as a cerebral edema probably as the result of the iodides. No treatment for her actinomycosis was given for a month and the patient came out of the coma satisfactorily. Since this time she has received bi-weekly doses of sulpharsphenamine, both intravenously and intramuscularly, and she has improved somewhat. There has been much pain and swelling of the joints, and she has been quite uncomfortable, but the skin and subcutaneous lesions have ceased to form and there is only one draining sinus in the right axilla.

Fig. 1, Case 2

Case 2.—J. R., a negro male laborer, aged 22, was admitted to the colored division of the Grady Hospital, April 10, 1929, complaining of a swollen jaw (*Fig. 1*).

History.—His present illness began about a year before, when he noticed a dull aching pain in his teeth and left jaw. A short time later he noticed a small, hard, painless tumor in the left parotid region, under the angle of the jaw. The mass slowly increased in size and during the summer of 1928 he found difficulty in completely opening his mouth. At this time, a physician lanced the mass, from which he obtained no pus. This area has since remained as a draining sinus. Since the fall of last year the mass has slowly grown to its present dimensions and two more draining sinuses have appeared.

His family and past histories are irrelevant except that he has had "bad blood" and has received treatment for it.

Examination.—The patient is a well developed and nourished negro who does not appear ill. There is a large irregular nodular mass about the size of an orange protruding from under the left mandible and extending into the face. There were three sinuses in this mass draining a clear, yellow serum. There was a partial trismus of the jaw, the teeth were carious and there was a large cavity in the left lower second molar. The general physical examination was negative.

The urinalysis was negative. Red blood cells numbered 4,210,000 per cu. mm., and the white blood cells 10,100. The hemoglobin was estimated at 80 per cent, and the differential count was normal. The blood Wassermann was negative.

By curettage of one of the sinuses we were finally able to obtain a small amount of blood mixed with a gelatinous material in which a mass of intertwined mycelial filament was demonstrated. We were unable to cultivate any fungus from these curettings.

Treatment.—The patient was placed on increasing doses of potassium iodide and at the end of three weeks he was taking 300 drops three times a day, but, because of loss of appetite, this was discontinued. He received at weekly intervals sulpharsphenamine intravenously for four doses, and one one-quarter skin unit of superficial x-radiation. At the end of five weeks there was no perceptible improvement, and he was discharged with instructions to return to the outpatient department, but he was never seen again.

Case 3.—T. W. R., a white American farmer, aged 42, was first seen April 5, 1929, complaining of a draining sore in his neck (*Fig. 2*).

History.—His present illness began some twenty-five years ago. He first noticed a small, hard, painless tumor under the angle of the left jaw. The tumor grew very slowly, giving him no discomfort until the summer of 1928, when it had grown to the size of an orange. In June it ruptured and several sinuses appeared, which drained a thin, yellow serum. A surgeon told him he had a fibrous tumor, and removed it. Two months after the operation the apparently clean scar broke down and a large ulcer appeared, which rapidly spread, involving the greater part of the right side of the neck. Later, his head was pulled to the left and he had almost complete trismus of the jaw. He soon began to spit up large quantities of foul smelling pus. Able to take but very little food, he lost weight rapidly, and he was confined to bed by a low grade fever. On consulting the surgeon he was told that he had a recurrence of a cancer of the neck and that nothing further could be done.

His family history was irrelevant. He was admitted to the Georgia Baptist Hospital September 2, 1928. A clinical diagnosis of mixed tumor of the parotid was made and he was operated upon the next day. An encapsulated tumor the size of a small grapefruit was removed with difficulty, and the patient had an uneventful recovery. The pathologist made a diagnosis of degenerating fibroid tumor.

Examination.—The patient was a well developed but poorly nourished man, who appeared very ill. He had obviously lost weight. The head was pulled to the left and he spoke hoarsely and with difficulty from a closed

Fig. 2, Case 3

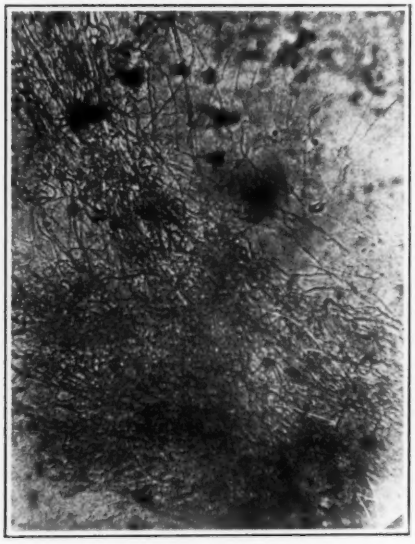

Fig. 3
Mycelia from Case 3.

mouth. The greater part of the left side of the neck and shoulder was involved in an inflammatory process. Along a five-inch incision scar, involving it and an area extending below and behind the ear, and under the angle of the jaw, there was a deep ulcer, draining copiously pus and serum. The edges of the ulcer were hard and indurated, and studded with numerous small translucent tumors giving the area a beaded appearance. The induration of the surrounding tissue extended to the shoulder and to the anterior chest wall. On the chest wall and back of shoulder, the skin and subcutaneous tissue were hard and board-like and had a violaceous color, like that of a scleroderma. Some of this induration extended to the face and the left cheek was edematous. The whole area was very tender and on palpation of the neck the patient said he felt the mass move inside his throat. The teeth were carious and the sordes on the gums was very extensive. The general physical examination was negative with the exception of a very weak rapid pulse and a temperature of 101°. The condition had all the appearances of a carcinoma *en cuirasse*. However, some of the secretion and tissue were scraped from the ulceration behind the ear and examined under the microscope. When pressed out under the cover glass in 20 per cent sodium hydroxide solution and examined, large masses of twisted and intertwined masses of mycelial filaments were found. These masses of mycelia resisted the caustic action of the solution for over 48 hours. The clinical appearance of the lesion belied our findings, so a portion of the hard indurated tissue of the shoulder was removed and a slice of the subcutaneous tissue was examined after being in sodium hydroxide solution for an hour. The tissue was found to be almost replaced by the numerous mycelial filaments (*Fig. 3*). Pathological sections showed a marked fibrous replacement of tissue and round cell infiltration. The curettings from the ulceration were cultivated on Sabouraud's media, both aerobically and anaerobically, but only pyogenic bacteria could be grown.

Treatment.—The patient was given ascending doses of potassium iodide, one injection of sulpharsphenamine, and two unfiltered, one-half skin units of x-radiation. He showed no improvement and gradually lost weight

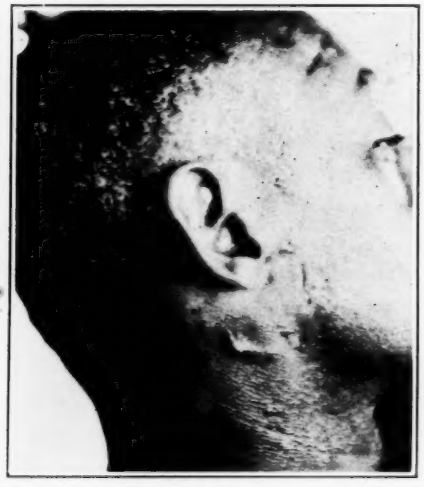

Fig. 4, Case 4

Fig. 5, Case 4

and strength. He died in May, 1929, after rupture of an abscess in the throat.

Case 4.—W. J., a negro, male, elevator operator, aged thirty-nine, complained of draining sores on the forehead, neck and chest (*Figs. 4* and *5*).

History.—His present illness began in September, 1927, when a small tumor appeared over his sternum. At the same time a similar tumor appeared on the left forehead and the glands in the right side of his neck became swollen and painful. All areas slowly enlarged, but only a slight tenderness on pressure was noted. In January, 1928, the tumor in the neck opened and began to discharge a creamy yellow pus, which soon became straw colored. On April 6, 1928, he was admitted to the hospital and the tumors in the neck and chest were incised and creamy yellow pus was obtained. Since this time the areas have never healed and they continue to drain a thin, straw colored fluid.

His family history and past history are irrelevant.

He has been admitted to the hospital on four different occasions and has always run a low grade hectic temperature, varying from normal to 101°. His Wassermann reaction has been repeatedly positive, but routine antisyphilitic treatment has not alleviated his condition. The pus from these draining sinuses has been repeatedly examined and no "sulphur granules" were found. Repeated culture showed only the growth of the pyogenic bacteria. He had on one occasion taken potassium iodide up to 30 drops three times a day, apparently on the supposition that he had a fungus infection, but received no benefit from it.

Examination.—The patient was a well developed, but poorly nourished negro, who appeared ill. He presented four draining sinuses with some scarring and brawny induration in the neck, just below the jaw, and a small tender sinus on his forehead just above the right temple. There was a depressed area about the size of an orange in the center of the chest at the lower end of the sternum. In the center of this area there were one large and two small pouted lip-like sinuses draining a thin yellow pus. The right knee was markedly swollen and tender, and floating of the patella revealed the presence of fluid.

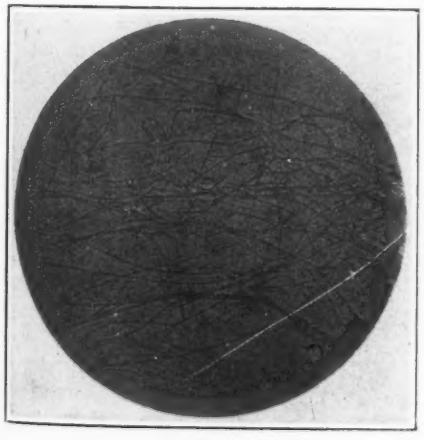

Fig. 6
Mycelia from Case 4

The sinuses in the chest were curetted and a large amount of pus and blood with a translucent gelatinous substance was obtained. When examined under the microscope, the gelatinous substance was found to be made up of a mass of twisted and intertwined mycelial filaments (*Fig. 6*). The filamentous ends of this organism were enlarged and many small, round bodies were seen. These small bodies were interpreted as spores. Repeated attempts to cultivate this organism, both aerobically and anaerobically, met with no success.

A section of tissue taken from the edge of a sinus in the chest showed the typical pathological picture of an infectious granuloma. The subcutaneous tissue was replaced by new fibrous tissue and blood vessels, with a marked round cell infiltration and numerous multinucleated giant cells. No fungi could be seen in the sections. The urinalysis was negative on all occasions and the red and white blood cells were normal. The Wassermann was positive.

He had numerous x-ray examinations. Fluoroscopy and roentgenograms of the chest showed a soft tissue tumor on the anterior chest wall which was not continuous with shadows cast by the heart and aorta. Later, roentgenograms showed evidence of bone necrosis in the sternum. A lateral film of the skull showed an area of necrosis in the right tempero-frontal region about 1 cm. in diameter. There was never any x-ray evidence of bone destruction in the knee, and the numerous chest plates never showed evidence of intrathoracic disease.

Treatment.—The patient was immediately started on large ascending doses of a saturated solution of potassium iodide, and for a period of ten weeks he was able to tolerate 400 drops three times a day. Under this treatment the sinus in the head cleared up and the thickening in his neck improved. The sinuses in his chest continued to drain. For two months he was given sulpharsphenamine intravenously twice weekly and the chest lesions improved slightly. He was returned to his iodides, combined with a few doses of superficial x-ray therapy. He has improved considerably. However, at this writing, he still has two small draining sinuses in his chest.

Case 5.—A. F., a white American school girl, aged sixteen, was first seen in July, 1929, complaining of abscesses of the right cheek (*Fig. 7*).

Fig. 7

Fig. 8
Granule from Case 5

History.—The present illness began in January, 1929, when she noticed a small painless tumor in the skin of the right cheek, which soon abscessed and drained a thick yellow pus. Within a few weeks other tumors appeared, which were hard and inflamed. One of these abscesses was opened by a physician in Charleston, South Carolina, and she was told to use hot applications and iodine locally, but no diagnosis was made. From February until July small abscesses would form, rupture or remain as cysts. One week the condition would seem to be improved, while the next would find it worse. During this period she had had no marked constitutional symptoms, but had lost a few pounds in weight.

Examination.—The patient was a well developed and well nourished young girl with a somewhat lethargic appearance. The skin, other than the right cheek, was normal. On the cheek, about 3 cm. from the mouth, there was an irregular scar. Behind this scar a superficial cystic tumor topped a deep, hard induration, the lower border of which was red and tender. The hard, board-like induration extended back to angle of the jaw, and at this point the skin was red and tender as though an abscess were forming. The teeth were soft and several cavities were noted, but the gums were normal. The buccal mucosa was clear, but the subcutaneous tumors forced the cheek against the teeth.

The fluctuant tumor on the cheek was incised, and a large amount of thick yellow pus was obtained, in which numerous small yellow masses were noted. These masses, when pressed under a cover glass, were very soft, spreading into oval sheets of a much lighter color than the surrounding pus. Upon microscopic examination the mass appeared to be made up of radiating threads (?) giving the whole an aster-like appearance (*Fig.* 8). The curettings from the walls of the cavity had a gelatin-like appearance mixed with pus and blood. When viewed under the microscope, this gelatin-like substance was found to be composed of masses of entwined mycelial filaments. Tubes of Sabouraud's media were inoculated, but only on one occasion did any growth appear. In this tube white mycelial filaments appeared, growing from the edge of a blood clot, within the first 48 hours. The fungus grew very rapidly, extending hyphae throughout the tube. As it grew, the base became very dark and in old cultures it was a deep black. In hanging drop culture the fungus was made up of thick septate mycelial filaments which produced endospores and arthrospores.

Treatment.—Since the fungus grew in only one of the culture tubes we later assumed the organism to be a contamination. But a vaccine from the fungus had been made and the patient was given small doses subcutaneously, every other day for six weeks. She was also given one-quarter and one-half skin units of superficial x-ray therapy at intervals of one to two weeks from July until the last of September. During this time she received large doses of a saturated solution of potassium iodide, starting with a half-teaspoonful four times a day and at one time taking as much as ten teaspoonfuls three times a day. She at no time showed any signs of iodism and complained of only mild gastric disturbances when taking the largest doses.

She improved from the start. The induration gradually disappeared and the abscesses cleared up. The lassitude disappeared and at this writing she has only a small draining area where the abscess was opened.

Case 6.—A. H., a white American barber, aged 34 years, was first seen in May, 1929, complaining of a swollen and draining left jaw (*Fig. 9*).

History.—In March, 1929, he had noticed a small, hard lump about the size of a walnut just under the left jaw. It gave him no trouble until the first of April, when it became larger and inflamed, involving the neck and causing his jaw to become partially locked. He was seen by a physician and sent to the hospital, where the area was incised. The hospital notes show that about "20 c. c. of thick yellow pus were obtained from a deep abscess of the jaw. There is an extensive hard induration in and around the abscess cavity." He improved very much and was discharged ten days later with a draining sinus. Four days after discharge he returned to the hospital with a temperature of 101° and a marked cellulitis of the neck. The draining sinus was further opened and hot applications insured a good drainage.

Fig. 9, Case 6.

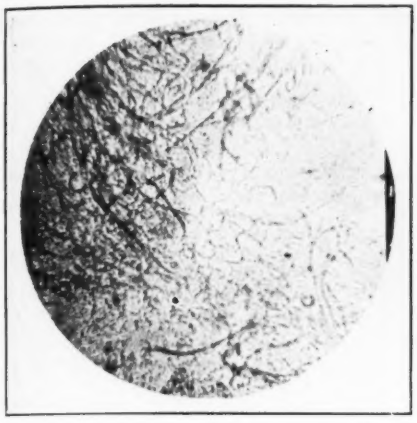

Fig. 10
Mycelia from Case 6.

In the past he had been a morphine addict and had had syphilis, for which he had received four courses of antisyphilitic treatment. His family history was irrelevant.

Examination.—The patient was a well developed and well nourished man who appeared ill. The left side of his neck just below the jaw and extending to the lower part of the face was inflamed and edematous. Just under the jaw bone was an elongated sinus draining thin yellow serum. The erythematous area around the sinus was very hard and indurated, and only slightly tender. No lymph nodes were palpable.

The general physical examination was negative and an x-ray showed no involvement of the bone. The hemoglobin was estimated at 80 per cent, and the red blood cells numbered 4,500,000. The white blood cells varied from 8,000 to 12,000, of which 65 per cent were polymorphonuclear leucocytes and 35 per cent were lymphocytes. The urine was negative and the blood Wassermann was positive.

Curettings from the walls of the sinus were made up of blood and pus with particles of a yellowish, translucent gelatin-like substance. This substance was easily crushed under a cover glass and microscopic examination showed it to be made up of masses of intertwined mycelial threads (*Fig. 10*). No granules were noted in the pus or discharges from the sinus at any time. The discharges and curettings were cultivated, both aerobically and anaerobically, but no growth was obtained.

Treatment.—The patient was immediately started on ascending doses of potassium iodide, and at one time was taking as much as six teaspoonfuls of a saturated solution of potassium iodide three times a day. He improved from the start. From June until September he was given weekly doses of unfiltered x-radiation to the part and also six intravenous injections of sulpharsphenamine. He has since taken a teaspoonful of a saturated solution of potassium iodide three times a day and when he was last seen the sinus had completely healed.

Due to the conflicting reports in the literature of the last twenty-five years, many erroneous conclusions about actinomycosis have prevailed. Prominent among these conclusions is the diagnostic fetich, "sulphur granule." Grains, or granules, of yellow color undoubtedly occur in long standing cases of actinomycosis, but their presence is by no means necessary for diagnosis. Except in one instance, no granules were ever observed in any of the foregoing cases. Brickner[21] only occasionally found anything conforming to the description of "sulphur granules" in cases of abdominal actinomycosis.

Due to the fact that granules are found only in long standing cases, and in the liquid contents of freshly opened abscesses in these cases, it would seem that too much diagnostic importance is attached to a peculiar terminal process of this disease. Frequently, by the time the granules appear, it is too late to hope for any good results from treatment.

Five of the six cases herein reported could, according to Castellani and Chalmers,[1] be classified under the term "paramycetoma." This disease is nothing more than actinomycosis, in which no grains or granules are found. It would seem possible that most of the cases of actinomycosis classified under this name would be the earlier discovered ones in which there has been no liquid media, in the form of pus and serum, in which the fungus spores may grow and form granules.

It is generally believed that actinomycosis is a rare disease, but Sanford's[19] recent report and the cases reported before and since, show that the disease is far more frequent than we have been taught. Bassoe's[19] remark that actinomycosis is more often found in the medical centers where the most thorough work is done is quite *apropos*. We are not recognizing all the cases we see.

It is difficult to cultivate the fungi that cause actinomycosis and more difficult to classify them when they are cultivated, so we cannot rely on the growth of the fungus for a diagnosis. The microscopic pathology of actinomycosis, unless mycelium is found in the sections, is almost identical with that of tuberculosis, and without the presence of the peculiar eosinophil bodies, described by Castellani and Chalmers,[1] the diagnosis is difficult. A definite diagnosis can be made, however, if one finds the fungus in curettings from a sinus by the following method:

The draining sinus is first washed with a small amount of normal saline, and with a small curette the walls of the sinus are scraped. Generally, a gelatinous tissue mixed with blood and pus is obtained. Small portions of the curettings are placed on a glass slide, covered

with a 20 per cent sodium hydroxide solution, and pressed flat with a cover glass. The fungus is generally seen in clumps of intertwined mycelial filaments as shown in *Figures 3, 6* and *10*.

It has been stated that the fungi causing actinomycosis never attack bone and are not passed by way of the lymphatics. While in the majority of cases this is true, *Case 4* had a definite necrosis of the bone of the skull and sternum and in *Case 1* the fungus undoubtedly passed by way of the lymphatics.

Many drugs have been used in the treatment of actinomycosis, most of them unsuccessfully, and a spirit of hopelessness in treatment has been written into the literature. Surgery has been found wanting except in the very earliest of cases, or when amputation can be performed. In four of the six cases herein reported surgery did far more harm than good, only opening an avenue for the spread of the disease. The drugs that have seemed to be of the most value have been the iodides and arsphenamine, the former acting theoretically as a "tissue solvent" and the latter, in some occult way attacking the causative fungus. The English and European physicians have claimed good results with autogenous vaccines, but it is doubtful that any specific antibodies for the fungus are formed in the human body. In addition to the iodides and arsphenamine, we may use x-radiation. The x-ray probably has no specific fungicidal action, and it is difficult to account definitely for its beneficial action. Using it as we must, empirically, it is a decided therapeutic aid. We believe its use accounts for the rapid improvement shown in *Cases 5* and *6*. Local irrigation with copper salts has been suggested because of their marked fungicidal action *in vitro*. This was attempted in *Cases 1* and *4*, but the consequent pain and discomfort was so severe that it was discontinued. The treatment of actinomycosis is by no means simple or completely satisfactory. The disease is exceedingly chronic, continuing sometimes for years, and the treatment must be persistent and constant.

In conclusion, we believe the following points about actinomycosis should be stressed:

(1) Actinomysosis (mycetoma) occurs more commonly than we are led to believe by the textbooks and the scattered reports in the literature.

(2) The finding of the "sulphur granule" is not necessary for a diagnosis.

(3) The fungus may be demonstrated in the infected tissue by curettage of a sinus.

(4) The treatment of actinomycosis consists in the persistent use of iodine, arsenic and x-radiation. The iodides should be given in very large doses (800 to 1,000 grains daily).

(5) The earlier the diagnosis, the better the results from treatment.

(6) Surgery should be resorted to only in the earliest of cases and in cases in which amputation can be performed.

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DISCUSSION (*Abstract*)

Dr. Bedford Shelmire, Dallas, Texas.—Many of us have been guilty of incorrectly diagnosing cases of actinomycosis, because we failed to find actinomycetic granules in pus from sinuses in expected cases. Curettage of suspected lesions with microscopic examinations of the scrapings should always be done. This is especially true of those indolent sinuses of the abdominal wall, often misleading without examination of scrapings of the sinus wall or microscopic study of excised tissue. This same holds true for old blastomycetic lesions, the fungus being demonstrated only after curettage of the lesions. Routine examinations, as pointed out here today by Dr. Alden, will prove this disease to be more prevalent than was heretofore suspected.

I have found the intravenous administration of diluted Lugol's solution to be more efficacious in this disease than the modes of treatment enumerated by the essayist. Five to 10 c. c. of freshly prepared Lugol's solution diluted with 50 c. c. of distilled water can be administered intravenously at one or two day intervals. In such a way I once administered 2½ ounces of Lugol's solution in a period of three weeks. The modification suggested by Ravaut, where Lugol's solution is mixed with an equal amount of a 20 per cent solution of sodium thiosulphate and introduced intravenously without further dilution, seems to be an improvement over the older method. However, I am convinced that

this resultant solution is less efficacious than the straight iodine-potassium iodide combination of Lugol.

Dr. Pardo-Castello, Havana, Cuba.—In the treatment of actinomycosis, we use a mixture of equal parts of Lugol's solution and 20 per cent sodium thiosulphate, beginning with small amounts and increasing gradually until 10 to 20 c. c. are reached. In all our cases the patients have tolerated the intravenous injections very well, and we have not seen any induration of the veins even after prolonged treatment. In some selected cases we have injected still greater amounts of this mixture, up to 40 c. c. without any untoward results. There is a chemical reaction in the mixing of both solutions, since the iodine is at once decolorized in the presence of thiosulphate. The new compound seems to be just as effective.

Dr. Andrew L. Glaze, Birmingham, Ala.—A case of actinomycosis was successfully treated and cured by Adrian Taylor, of Birmingham. Ten per cent thymol in oil was used to irrigate the sinuses, and thymol was administered internally. I am not aware that the drug has been used in this disorder before, and it appears to deserve further attention.

Dr. Alden (closing).—I have never used Lugol's solution intravenously, because I was afraid of the reaction. I have given sodium, or potassium iodide, in distilled water intravenously, but I had several severe reactions and so discontinued its use.

I have never heard of thymol being used in actinomycosis. Of course, it is a well known fungicide and it is certainly worthy of trial.

BILATERAL DOUBLE KIDNEY AND URETERS: CASE REPORTS*

By JAMES J. RAVENEL, M.D.,
Charleston, S. C.

Having recently seen a report of a similar case by W. C. Sterling and Norvell Belt,[1] and their remarks on the rarity of the condition, I have been stimulated to report my two cases. From their article it seems that about 51 cases of bilateral double kidneys and ureters have been reported, and of these about 20 have been diagnosed by cystoscopy and pyelography.

Possibly many of these conditions are overlooked, and I feel that if we are on the alert for them, they will not prove to be so rare.

Case 1.—K. C. S., No. 42287, an adult male, twenty-eight years of age, was admitted to Roper Hospital on September 11, 1926, complaining of pain in the left kidney area and fever. Two weeks before admission to the hospital he developed pain over the region of the left kidney posteriorly which at times radiated to the inguinal region of that side. At first the fever appeared only in the afternoon. There was no history of dysuria, past or present. The past history was negative.

The physician who attended this patient before the admission to the hospital thought that possibly he had malaria because of an enlarged spleen and the intermittent type of fever; he also considered typhoid fever, as there was a positive Widal report on the blood. After his admission one Widal was reported positive, two slightly positive and several negative.

Cystoscopy on September 13, 1926, showed a bladder normal in appearance and no obstruction to No. 5 catheters in either ureter. The drip from both catheters was normal.

URINALYSIS

	R. K.	L. K.	Bladder
Reaction	.....	.....	Acid
Specific gravity	.....	.....	1011
Albumin	.....	.....	0
Sugar	.....	.....	0
Acetone	.....	.....	0
Casts	0	0	0
Epithelium	+	++	+
Pus	+	+	+
Blood	+	0	0
Bacteria	0	0	0

On September 22, 1926, two ureteral orifices were found on the right side, one above the other. Urine from the upper right catheter was clear; that from the lower right catheter was cloudy. On September 27, cystoscopic examination showed two ureteral orifices on the left side; urine from the upper left catheter was dark and somewhat turbid; that from the lower left catheter was clear and lighter in color. A No. 5 catheter was obstructed in the lower left ureter 4 cm. from the bladder, but a No. 4 catheter passed 30 cm. without obstruction. The drip from both catheters was slow.

Case 1
Showing rather typical pyelogram of double ureter and pelvis on each side.

*Received for publication April 9, 1930.

*From the Department of Urology of the Medical College of the State of South Carolina.

MICROSCOPIC ANALYSIS

	Upper Right	Lower Right	Upper Left	Lower Left
Ca ts	0	+ c. gr.	0	0
Epithelium	0	+	+	+
Pus	0	+	+	+
Blood	0	0	++	0
Bacteria	0	0	0	0
Urates	+	++++	0	0
P. S. P. Functional:				
Appears	4 min.	4 min.	3 min.	7 min.
Per cent	15 per cent	3 per cent	12 per cent	2 per cent

Blood Count.—On the day of admission the total white count was 10,350 with 79 per cent polymorphonuclears and it remained approximately the same until October 5, when the total white count was 10,750 with polymorphonuclears 82 per cent. No plasmodia were found in the blood.

X-ray at this time was negative for calculi in the genito-urinary tract.

October 6, 1926, I did a left lumbar exploration, thinking that I was dealing with a perinephritic abscess, or some type of closed off infection. I was rather inclined to the latter, as there were no physical signs to indicate a perinephritic abscess. The left kidney was about one-half again as large as a normal organ and was densely adherent to the peritoneum over the upper two-thirds of the anterior surface. In stripping the capsule to free the kidney, I broke into a small abscess on the posterior surface near the convex border at about the junction of the lower and middle third of the organ. After a careful search I could find no evidence of further infection, so closed the wound in the usual manner, providing for drainage of the abscess and the kidney fossa. Immediately after the operation the temperature dropped, not going above 100° F., but on the third day the temperature again rose to 103°. He continued a septic course until October 19, when a transfusion of 515 c. c. of blood was given, after which he improved rapidly.

X-ray examination at this time showed two catheters apparently leading to two renal pelves on each side. The pyelogram showed a double pelvis on each side.

URINALYSIS NOVEMBER 29, 1926

	Upper Right	Lower Right	Upper Left	Lower Left
Ca ts	0	0	0	0
Epithelium	0	+	++++	+
Pus	0	+	+	+
Blood	0	0	0	0
Bacteria	0	0	0	0

Case 2.—M. L. B., a woman twenty-two years of age, was admitted to Riverside Infirmary, February 22, 1928. The family and past history were irrelevant.

About a month previously she had an infected tooth extracted and following this the tooth socket gave her a great deal of trouble. At this time she ran a low fever, and urinalysis showed albumin, casts and pus cells.

At the first cystoscopic examination only two ureteral meati were found with an obstruction 10 cm. up the left ureter. This obstruction gradually moved down the ureter and finally disappeared, but no stone was recovered. The x-ray report was negative for calculi.

A subsequent examination revealed two ureteral openings on each side and x-ray showed complete bilateral reduplication of ureters and pelves.

Urinalysis showed only an occasional pus cell from the upper and lower right kidney specimens, an occasional pus cell from the upper left, and two plus pus from the lower left kidney specimen.

The patient has made an uneventful recovery.

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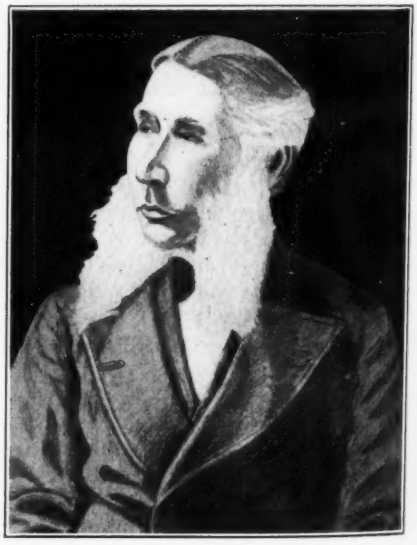
LIFE AND TIMES OF SAMUEL PRESTON MOORE, SURGEON-GENERAL OF THE CONFEDERATE STATES OF AMERICA*

By E. Robert Wiese, A.B., M.D.,
Schenectady, N. Y.

We purpose to sketch the life of the Surgeon-General of the Confederate States of America in the hope that time has so far overcome prejudice as to permit a great war surgeon and administrator to take his place with men of



DR. SAMUEL PRESTON MOORE
From a pencil sketch by Mr. Leo Lynch, made especially for the author of this paper.

*Received for publication January 3, 1930.

*From Glenridge Sanatorium, Schnectady, N. Y.

his caliber and class. Enormity destroys individuality and even in the early sixties armies were becoming too cumbersome to allow personal action on the part of those chief in command on the battle field. Striking and spectacular action was possible only to subordinates. Pickett, not Lee, led the desperate but glorious charge at Gettysburg and, as in his day, it was no longer possible for Jackson to raise aloft a fallen standard and lead his troops to victory as did Napoleon at Lodi, so, too, it was out of the question for Moore to do surgical miracles on the field of battle as did Larrey at Austerlitz and Waterloo.

Shortly after the occupation of Richmond by the Federal troops, April 2, 1865, fire broke out and destroyed, among many other buildings, the two houses used by the Surgeon-General as office and dwelling. The official documents pertaining to the Medical Department of the Confederate Armies and Navy were almost completely destroyed, as were also the many valuable records and papers relative to the Moore family which had been assiduously collected and preserved for many years. This sketch, therefore, gathered as it is from scattered sources, will of necessity resemble a mosaic both in material and in structure.

Samuel Preston Moore, the son of Stephen West and Eleanor Scriven Gilbert Moore, was born in August, 1813, in Charleston, South Carolina, of an old and well established family. When, in 1624, Lord Baltimore landed in Maryland to take possession of the gift from Charles I, he brought with him as his physician Dr. Mordecai Moore, ancestor of the Surgeon-General of the Confederacy.

Samuel Moore received his early education in his native state and graduated at twenty-one years from the Medical School of South Caroline with the degree of Doctor of Medicine. A few months later (March 14, 1835), he became assistant surgeon with rank of captain in the United States Army, and served successfully as assistant surgeon at Fort Leavenworth, Kansas, Fort Des Moines, Iowa, Fort Gibson, Missouri, Fort Coffee, Kansas, and at several posts in Florida. At this time (1835-1845) civilization did not extend much beyond the Mississippi River and the Great West was filled with bands of wild and hostile Indians. At best the life of assistant surgeon was not a sinecure and discipline was strict and rules were rigid.

Mary Augusta Brown, the daughter of Major Jacob Brown, at that time in command of the Seventh Regiment of the United States Infantry at Forts Pickens and McRea, and Dr. Moore were married in 1845, and in August of the same year went to Arkansas and then to Corpus Christi for a short time. For two years Dr. Moore was stationed at Carmago on the Mexican side of the Rio Grande, following which he was promoted to the rank of major and full surgeon while at the famous Jefferson Barracks, St. Louis, Missouri (1849). From here he went to Fort Laramie, Oregon (now Wyoming), where he remained until August, 1851. After a few months in San Antonio, Texas, he was transferred to Brownsville, or Fort Brown, Texas, named in honor of his father-in-law for his distinguished services in the War with Mexico. The few months between November, 1854, and July, 1855, were spent at Fort Columbus, Governor's Island, New York Harbor, from which place Dr. Moore was sent to West Point Military Academy. He was Medical Purveyor at New Orleans, Louisiana, from April, 1860, until his resignation from the Army of the United States, February 25, 1861. Thus were spent twenty-six years in active service in the United States Army.

At the time of his resignation, South Carolina had not only seceded from the Union (December 20, 1860), but a government made up of South Carolina, Florida, Georgia, Alabama, Mississippi, Louisiana and Texas had set up their capitol in Montgomery, Alabama, and had already elected Jefferson Davis Provisional President of the Confederate States of America (February 9, 1861). Henry L. Webb recommended Moore as Surgeon-General to Jefferson Davis in a letter dated New Orleans, February 20, 1861, but D. C. DeLeon (of Mobile, Alabama) and not Moore was the first Surgeon-General. DeLeon afterward became director of the medical division of Lee's army and held that position until he was thrown from his horse at Mechanicsville, when Dr. Lafayette Guild took his place.

Moore, following his resignation from the army, had gone to Little Rock, Arkansas, where he practised medicine until his appointment as Surgeon-General (November 7, 1861). It was infinitely more than a stepping into an already settled and smoothly moving position. It was his task to establish an entirely new office, and upon him descended an avalanche of work. The duties were arduous and exacting, the routine was killing, the emergencies to be met were

legion, the responsibilities were overwhelming, all decidedly too much for one man.

From the outset Moore was a strict disciplinarian and the enforcement of the rigid rules often seemed to men fresh from the unbounded liberties of civil life little short of tyranny. Complaints were not wanting, but it has been said by those competent to judge that the Medical Department was the best managed in the Confederacy.

Four years of Civil War, bitterly, desperately, mortally fought, developed all the resourcefulness, the executive ability and achievements for which Moore is known to the history of medicine.

The Civil War over, Moore took the oath of amnesty June 22, 1865, and while he did not leave Richmond, he never thereafter really practised medicine. Fortune had been kind to him in that he had not lost his wealth, in spite of the great vicissitudes of war. This independence, however, seemed to sharpen rather than to blunt his interests. From 1874 to 1881 he was an active member of the Executive Board of the Virginia Agricultural Society and the annual State Fair would have been incomplete without his well known figure. For twelve years he served as a member of the Richmond School Board, of which he was chairman of the committee on teachers and schools. He did not regard these duties lightly, but made it part of the day to visit the superintendent, discuss with him pedagogic questions and carry out several innovations of his own, chief of which may be mentioned the introduction of eyesight tests, of mechanical drawing and of vocal training, the latter, however, not for aesthetic reasons, but because of the exercise and the pulmonary ventilation incidental to it.

His interest in affairs incidental to the Confederacy never waned.

While apparently always in good health, frequent attacks of trifacial neuralgia kept Moore apprehensive at all times and compelled him to carry with him a small vial of chloroform, the one thing capable of relieving the excruciating paroxysms.

After a day devoted to his usual activities, he was seized at midnight with a violent attack of coughing and he died of acute congestion of the lungs at 1:15 the morning of May 31, 1889.

DRUGS OF THE CONFEDERACY

At the outbreak of the greatest civil war in history there were few, if any, factories, foundries or manufactories of any size in the Southern states. There were few mechanics and still fewer artisans. Neither were there any great depots or store houses of manufactured goods. In short, the South at the onset of war was dependent upon European countries for nearly everything except men. While in the larger cities the drug houses carried comparatively large supplies of drugs, it would not have been long before these would have been exhausted had they not been constantly replenished. The Federal blockade included and declared contraband of war all medical and surgical supplies and had it not been for the activities of blockade runners, smugglers across the Rio Grande and Northern sympathizers, the dearth of drugs would have been pitiable. By the time the blockade had become effective and the fall of Mobile and Vicksburg had made smuggling almost impossible, the supply had been renewed by recourse to native plants, and the frequent capture of Federal army divisions aided not a little.

Attention was early turned to native plants and herbs, and in 1862, at the instigation of Moore, Francis Petre Porcher, lecturer in materia medica and therapeutics at the Charleston Medical College, wrote the short book with the lengthy title, "Resources of Southern Fields and Forests, Medical, Economical and Agricultural, Being Also a Medical Botany of Southern States with Practical Information on the Properties of the Trees, Plants and Shrubs." A few examples are cited here, the usual name being given first with the substitutes following:

Aloes—mulberry root, wild jalap, wild potato vine.

Digitalis—blood root, wild cherry, bugle weed, jessamine.

Ergot—cottonroot.

Ipecac—wild jalap, Carolina hippo.

Calomel—dandelion, butterfly weed, pleurisy root.

Belladonna—Jamestown weed.

Hyoscyamus—Jamestown weed.

Chamomile—dogwood.

Colocynth—alum root.

Laudanum—hops, motherwort.

Gum Arabic—low mallows apple, pear gum, watermelon seed.

Colochicum—Indian poke.

Diuretics—blackberry, dogwood, gentian, pipsissewa.

Antipyeretics—dogwood bark.

Decoctions of the leaves and the bark of black willows and button willow were used in malaria.

Stillingia, or queen's root, was used in blood diseases.

Decoctions of stramonium leaves and of maypop root were used to control nervous symptoms in fevers and to regulate the heart.

Fresh slippery elm bark, the root and leaves of the manoa plant, the leaves of the common cactus shorn

of its spines and well pounded were recommended as substitutes for flaxseed meal.

Knotgrass was presented as a powerful astringent in diarrhea, while the ubiquitous rheumatism was treated with mountain laurel.

There was no lack of whiskey. The moonshiners of Kentucky and Tennessee saw to that, and capture made a great plenty in the land. For example, at the second battle of Manassas, a large supply of "Cozen's Best" was taken among other valuable supplies.

There appears to be unanimity in the statements that there never was a serious shortage of those most important drugs, chloroform, opium and quinine. In order to forestall any shortage in opium, attempts were made to grow opium in North Carolina and Florida, and while the cut, unripe capsules gave a dark green fluid not unlike the Turkish in its action, the attempts were not unqualified successes.

While the chloroform was not chemically pure, there was not a single death reported from its use. Dr. Hunter McGuire, General Jackson's chief surgeon, alone records having used chloroform forty thousand times without a fatality.

For the preparation of these drugs, as well as for the manufacture of hospital supplies and of surgical instruments, Moore established factories at several points. So far as was possible he used disabled soldiers for the work and he and the War Department were almost constantly at odds in his struggle to keep the men he had trained in this special work from being taken from him and sent back into the front ranks.

OTHER PHYSICIANS

Another difficulty facing the Surgeon-General was the lack of competent surgeons. At the outbreak of hostilities not a few physicians, enticed by the hope of more rapid and higher promotion, had volunteered either as officers or as privates in the ranks. Of the one thousand surgeons and two thousand assistant surgeons in the Confederate Army and Navy, only twenty-four had been in army service and had resigned. About these twenty-four as a nucleus there was built the highly efficient medical department of the Confederate states. A very remarkable achievement! And this was due to the tireless efforts and executive ability of the Surgeon-General. These men cared for six hundred thousand Confederate soldiers, two hundred and seventy thousand prisoners and treated over three million wounded and diseased.

The status of medical men as belligerents was definitely settled early in the war. In May, 1862, General Jackson, the great Stonewall, having captured at the battle of Winchester the Federal hospital division, acted upon the council of Dr. Hunter McGuire, his chief surgeon, and ruled that as physicians did not make war, they should not be made to suffer its penalities, and he returned the captured division unconditionally to their army. This was the first recognition of the neutral state of physicians, a thing agreed upon later at the Geneva conference.

Moore organized the Medical Corps of the Confederate states upon the same scheme as that of the United States Army. There were the same divisions and discipline. The same three ranks were recognized:

(1) One surgeon-general, ranking as brigadier-general with the same salary, privileges and allowances.

(2) About one thousand surgeons, ranking as major of cavalry, with like pay, allowances and privileges.

(3) About two thousand assistant surgeons with the rank of captain of cavalry with the same pay, rights and allowances. There were in addition a number of so-called contract, or acting assistant surgeons, ranking as second lieutenant of cavalry, who were not regularly employed.

Moore, as soon as he could, organized, and served as first president, "The Association of Army and Navy Surgeons of the Confederate States of America" (August, 1863). He also exercised all his influence to have published the short lived monthly *Confederate States Medical and Surgical Journal*, which was printed under his editorship by Ayres and Wade in Richmond, Virginia, from January, 1864, to February, 1865.

In 1863, surgeons detailed by Moore compiled and published in Richmond, Virginia, "A Manual of Military Surgery for the Army of the Confederate States." The Government distributed these to both field and hospital surgeons. The paper was as good as could be procured under the circumstances, the printing was such as might excite the laughter of an expert printer and the illustrations, while correct in detail, were crowded several on one page. Although the text was good, the anatomy was not clear. There were, as might be expected, many interesting chapters:

(1) Shock and collapse were treated by alcoholic stimulation and mustard plasters. The latter were applied to the abdomen, while ice and soda were given by mouth to still the vomiting.

(2) Tetanus was dismissed as briefly as was the Irishman's chapter dealing with snakes in the Emerald Isle: "To enumerate the means used for the relief of tetanus would require a volume; to record those entitled to confidence does not require a line."

(3) Cases of pyemia and gangrene were isolated in clean quarters, were given fresh air, good food, stimulation.

(4) Erysipelas, looked upon as a condition closely allied to pyemia, brought about by wounds, was treated by general measures, pleasant surroundings, fresh air, good food, rather than anything specific.

(5) Hospital gangrene was combated by the use of the cautery and nitric acid. In selected cases Labaroque's solution, a strangely familiar mixture when we compare its scientific name with that of Dakin's solution, was used with fairly good results.

Surgical operations, gunshot wounds, ligation of vessels, amputations, resections, treatment of hemorrhages occupied the greater part of the volume.

HOSPITALS

The only large building in Richmond in 1861 capable of being converted into a hospital was the almshouse, which accommodated about five hundred persons, and these beds were quickly filled by the Federal wounded. Confederate wounded were treated either in the large tobacco warehouses or in private homes, and neither place was conducive to routine treatment, central control or proper regulation of infectious diseases or contagions. Buildings of undressed plank and of a size sufficient to accommodate at least thirty-two patients were easily and quickly constructed. Each such building constituted a separate and independent ward. These were the famous "Hospital Huts," used for the first time in the Confederate Army and intimately associated with Moore's name. If for nothing else, Moore is known for this style of hospital construction, the forerunner of the modern pavilion type. Fifteen to twenty such huts constituted a division and three or more divisions made up a general hospital. There were five of these general hospitals erected in and about the Southern capital in a very short time. The construction permitted easy segregation and isolation of any ward without disturbing in any way the routine of the hospital.

Later, when the need of larger hospitals became acute, Moore selected Chimborazo Hill as the site of what became the largest military hospital in the world up to that time. Dr. James B. McCaw was chief in command. There were one hundred and fifty wards, each 30 by 100 feet and each capable of accommodating forty to sixty men; in each of these the cots were arranged in two rows on either side of a wide central aisle. Wide alleys and streets separated the individual wards, while a wide boulevard surrounded the institution. It was divided into five general hospitals, each under its own surgeon, who had from forty to sixty assistants. There was an excellent water supply and more than adequate drainage. Chimborazo will go down in the annals of wonderful hospitals, as seventy-six thousand patients were treated within its walls during the few years of its existence.

TREATMENT OF WOUNDS

In discussing the treatment of wounds in the Confederate Army let it not be forgotten that this was the day of "laudable pus," the pre-antiseptic days, when suppuration was the rule rather than the exception.

The average musket ball weighed approximately an ounce and as it was of low velocity, produced fractures rather than the frightful bone destruction and splintering wrought by the Minie or the Enfield bullet. It was soon learned that amputation was the only means of saving life in case of wounds produced by the later bullets and while in joint wounds resection was the rule, the prognosis, at the best, was very bad. Resection of the joints of the lower extremity offered practically no hope. Indeed, it is recorded by Sorrel that the only successful resection of the knee joint in either army was performed at the Officers' Hospital in Richmond, Virginia, by Dr. J. B. Read, of Savannah, Georgia, upon a man named Reynolds.

Wounds were washed with infusion of white oak bark, the edges trimmed, approximated and moist dressings applied; or in not a few instances, continuous irrigation was established by means of cotton or linen strips, one end of which was in a vessel above the level of the wound. The wet dressings, however, led to sloughing and later dry dressings were used. Old sheets, worn cotton or linen goods, cotton carded by hand or separated from the seeds by women or children and then baked in a very hot oven, lint, all were utilized whenever and wherever available, and some remarkable cures were reported. Terrel, for example, in charge of General Hospital No. 1, Division 3, Lynchburg, Virginia, treated six hundred and fifty cases with dry lint and had but one case of gangrene.

It is said that blessings not infrequently come disguised. In the light of more recent knowledge, Fate was kind to the Confederate Medical Corps in not a few cases. For example, they used no sponges to wash out wounds as did their Northern brethren. They used instead clean rags, boiled, washed out carefully and then ironed with a very hot iron. They had no catgut and but little silk thread, but they boiled

horse hair to make it pliant and soft, and incidentally sterilized it, although they knew it not.

Another treatment suggestive of present day methods was that of erysipelas. When pus formed in case of this disease, the area was incised freely and then washed out carefully with chlorinated water, three or more times daily. The importance of general treatment was not ignored, however, and good food, fresh air and isolation were always stressed.

Broken bones were not uncommon. Compound fractures were first washed with soap and water, then with turpentine and then again with soap and water. The fragments were then approximated as closely as possible and starched rolls were applied and allowed to dry..

Instruments were far from plentiful at the beginning of the war and as time went on the need became distressing, as the South had no factories capable of producing surgical steel in great quantities. The supply was replenished by the activities of blockade runners, contributions by the widows and children of physicians and surgeons and by capture. Books were, if anything, harder to secure than were instruments. The Department bought all it could from village and country practitioners when they would not contribute them, and many a copy of Wilson's "Dissector," Ericksen's "Surgery," Wood's "Practice," Farmer's "Practice," Druitt's "Surgery," Bartlett's "Fevers," and the "U. S. Dispensatory" were sought out and bought.

NURSING

At that time there was no central organization of women in the South, as existed in the North, to control women nurses, but never was there lack of tender womanly nursing. All such services were given without compensation of any sort.

Miss Sallie Louisa Tompkins, the daughter of Christopher and Maria Patterson Tompkins, was born at Poplar Grove, Mathews County, Virginia, November 9, 1833. When the Confederate Government, unable to care for all the wounded and sick, made its general call upon the people, Miss Tompkins opened a hospital in the Robertson home at the northwest corner of Third and Main Streets, Richmond, Virginia. Judge John Robertson had sent his family to his farm for the duration of the war and had offered the young lady, then only twenty-eight, the use of his house. The Robertson Hospital opened its doors July 31, 1861, and was operated and maintained at Miss Tompkins' expense until July 13, 1865. Within that time nearly fifteen hundred soldiers were treated and restored to health in that institution and when, because of lax practices in some hospitals, the Confederate Government passed the law that hospitals for soldiers should not be permitted to operate unless under the supervision of an officer no less than captain, Miss Tompkins received the commission of captain from Jefferson Davis because of the brilliant record of her hospital. She was the only woman in the Confederate states to be so ranked. She died July 25, 1916, and was buried in the grave yard of the old church in Mathews County, Virginia.

"The Florence Nightingale of the South" was the widow of Dr. Frank Newsom of Tennessee, who at the outbreak of the war went to Memphis and began work under Dr. Keller. From there she went to work under Mrs. Law in the Southern Mothers' Home. She took charge of the Overton Hospital after the battle of Belmont until December, 1861, when she took charge of the hospital in Bowling Green. Shortly before the fall of Forts Henry and Donaldson, she hurried to Nashville and converted the high school at that place into a hospital. Before the fall of Nashville, however, she carried her sick and wounded to Winchester, Tennessee, whence she took them to Atlanta, Georgia. After the battle of Shiloh she became head of the hospital there and later was in command of the Ford Hospital in Chattanooga, Tennessee.

Mrs. Felicia Grundy Porter collected great sums of money for the relief of the maimed, both by private subscription and by arranging concerts and tableaux in towns and cities. The funds were largely spent in providing artificial limbs for the soldiers and many a veteran thanked this resourceful, energetic, kind woman for his ability to get around.

These are but three of the thousands who "countless and nameless the cold, hard pathway trod." It was women such as these who made possible the great and glorious history of this United States of America.

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Glenridge Sanatorium.

INTRACISTERNAL THERAPY IN NEUROSYPHILIS*

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The cisterna magna (cerebello-medullaris), within the past few years, has come to be an important center of approach to the cerebrospinal fluid spaces. Neurologists have come to depend on this anatomical structure to aid in both diagnostic and therapeutic procedures probably more than any other one structure. For diagnostic purposes, the cisterna is used when it is desirable to obtain cerebrospinal fluid for examination. It is used for injecting descending lipiodol preparations in localizing cord tumor and spinal subarachnoid block; it may be used in conjunction with the Quickenstedt test.

There are patients who have terrific "post spinal" headaches, but who have no discomfort following withdrawal of fluid from this cisterna. For therapeutic procedures, in epidemic cerebrospinal meningitis and in other forms of purulent meningitis this structure is called upon frequently for service. It is the region of choice for injecting anti-meningococcic serum since cerebrospinal meningitis affects the cerebral areas as well as the spinal, and since the cisterna magna is more of an anatomical and physiological distributory center than the lumbar subarachnoid space. Various serums and autogenous vaccines may be injected in this region. Through this structure and with the aid of a spinal needle in the lumbar region, irrigation of the base of the brain and spinal cord can be done. For this purpose Ringer's solution is preferable, but warm normal saline may be used. The above procedures are used more in the acute purulent infections of the meninges than in other types of conditions. It is not very often that purulent forms of meningitis recover, or of tuberculous meningitis.

*Read in Section on Neurology and Psychiatry, Southern Medical Association, Twenty-Third Annual Meeting, Miami, Florida, November 19-22, 1929.

CASE REPORT

C. M., a white woman, age 23, was admitted to the American Legion Memorial Hospital March 31, 1929. She complained of headache and general malaise. Her temperature was 98.4°, pulse 96, and respiration 22. Frequent vomiting, an irregular septic temperature (97 to 103°), and restlessness continued for several days. Loss of sphincter control developed. I was called in consultation April 13, two weeks after the onset. The patient was extremely delirious and was rapidly developing physical exhaustion. History, physical examination, and initial examination of cerebrospinal fluid (*Column 1, Chart 1*), pointed to a meningo-encephalitis, or a low grade meningitis. The temperature ranging around 100°, but fluctuating irregularly from 97 to 103°; the fact that the individual, although continuing to fail, was alive two weeks after the onset; and the spinal fluid examination, made us at the time consider the tubercle bacillus as the causative organism. The blood count was never over 11,000 total whites and averaged 76 polymorphonuclears and 19 lymphocytes.

From the chart, one sees that five lumbar punctures, three cisternal punctures, three irrigations of the subarachnoid spaces, and two injections of antimeningococcic serum were given. Two of the irrigations were made with needles simultaneously in lumbar and cisternal regions, washing from the cisterna toward the lumbar region. With the exception of the last lumbar puncture, these treatments were given within a period of six days. The bacteriological cause was never proven. (The inoculated guinea pig was permitted to live two months when it died, and was then, through a mistake by a laboratory technician, discarded.) The patient made a rather rapid convalescence. In two weeks she was walking. She then gradually recovered and six months later, having married, she visited her former nurses at the hospital.

In certain types of neurosyphilis, such as tabes dorsalis and syphilis with optic involvement, the Swift-Ellis method of intraspinal treatment is probably more beneficial than any other form of treatment. During the past year I have come to use the intracisternal method in certain stages of certain types of this condition. In treating neurosyphilis intracisternally, the following types were selected:

(1) The various forms of spinal cord involvement.

(2) The various forms of optic involvement and ophthalmoplegias.

CHART I

CASE REPORT: C. M. SUMMARY OF TREATMENTS AND FLUID EXAMINATIONS

I	II	III	IV	V	VI	VII
Date	April 13	April 14	April 16	April 17	April 18	April 21
From	Lumbar Region	Cisterna	Cisterna and Lumbar	Cisterna and Lumbar	Lumbar	Lumbar
Cells	1,050 Total 80% Polys. 6% Monos. 14 % Lymph.		866 Total 70% Polys. 25% Lymphs. 5% Monos.	12 Total		8 Total
Pressure	Increased	Increased	Increased	Moderate	None	None
Transparency	Cloudy	Cloudy	Cloudy	Clear	Clear	Clear
Globulin	Heavy	Heavy	Heavy	Heavy	Positive	Positive
Pellicle	Yes	Yes	Yes	Yes	No	No
Bacteria	None found: Centrifuged and pellicle	None found: Centrifuged and pellicle	None found: Centrifuged and pellicle	None found	(Not examined)	None
Culture	Negative (24 and 48 hrs.)—Infusion broth and serum		Guinea pig inoculation at University Hospital (See notes)	None found	(Not made)	
Wassermann	Negative		Negative			
Treatments	Drainage only	Irrigation with normal saline through cisternal needle 10 c. c. conc. antimeningococcic serum intracisternally	Irrigation with normal saline through cisternal and lumbar needles	Irrigation with normal saline through cisternal and lumbar needles 10 c. c. conc. antimeningococcic serum intracisternally	Drainage only	(For examination only)

(3) Those forms of cerebrospinal syphilis having essentially negative serological reactions of the fluid, but which have failed to improve clinically with other methods of treatment.

(4) Those of that large group, the paretics, who have responded well clinically to other forms of treatment, but have persisted after two or three years of care, in having a positive Wassermann or other prominent signs of cerebrospinal syphilis.

(5) Those individuals having neurological and mental symptoms of early neurosyphilis, regardless of whether or not the fluid gave positive syphilitic tests.

It is not my intention to advocate the use of this form of treatment to the exclusion of others, but it has a proper place. In order that there may be a clear understanding of what is meant by its proper place, there is here given an outline (*Tables I* to *V*) of various methods of treating syphilis of the central nervous system. *Tables II, III, IV,* and *V* give the various subdivisions of *Table I,* with their respective brief explanatory divisions. One will note in these outlines that the procedure being discussed is only one of many different methods.

TABLE I

TREATMENT OF NEUROSYPHILIS

(A) General care.
(B) Use of chemotherapeutic agents.
(C) Fever therapy.
(D) Injections into cerebrospinal fluid spaces.

TABLE II

(A) GENERAL CARE

(1) Routine method of living, i. e., regular hours of eating, sleeping, resting.
(2) A constant environment and with no excitement.
(3) Freedom from all responsibilities.
(4) Freedom from all worries, as much as possible.
(5) Contentment and quiet if possible; hospitalize if necessary.

TABLE III

(B) USE OF CHEMOTHERAPEUTIC AGENTS

(1) Mercury preparations:
  (a) Solubles, as mercuric cyanide, etc.
  (b) Insoluble, as mercury salicylate.
  (c) Mercury innuctious.
(2) Bismuth preparations:
  (a) Soluble, as potassium bismuth tartrate.
  (b) Insoluble, as neo-trepol.
  (c) Bismarsen.
(3) Arsenical preparations:
  (a) Arsphenamine series.
  (b) Trypharsamide.
  (c) Bismarsen.
(4) Iodides.

TABLE IV

(C) Fever Therapy

(1) Infections:
  (a) Tertian malaria.
  (b) Soduku (?).
  (c) Relapsing fever (?).
(2) Bacterial proteins:
  (a) Mixed typhoid vaccine.
  (b) Coley's vaccine (?).
(3) Other foreign proteins (?):
  (a) Sodium nucleinate (?).
(4) Hot baths, diathermy, etc. (?).

TABLE V

(D) Injection Into Cerebrospinal Fluid Spaces

(1) Intraspinal:
  (a) Swift-Ellis, with and without modifications.
  (b) Mercurialized serum.
(2) Intracisternal:
  (a) Arsphenamized auto-serum.
  (b) Mercurialized serum.
(3) Intraventricular (?):
  (a) Arsphenamized auto-serum.
  (b) Mercurialized serum.

There are many types of neurosyphilis. Before individuals with this disease process can be properly treated and before the relatives can be given a fairly accurate understanding of the patient's future, the physician himself must have that patient's exact type of condition well in mind. It may be necessary to observe the sick individual for some time and to observe the patient's response to treatment before a fairly accurate opinion can be voiced. There are many possibilities in neurosyphilis and the physician should expect to give each patient individual treatment. The following types of neurosyphilis, classified according to clinical and pathological findings, should always be considered in outlining the patient's treatment (*Table VI*).

TABLE VI

Types of Neurosyphilis

(1) Parenchymatous:
  (1) General paralysis.
  (2) Tabes.
  (3) Tabo-paresis.
(2) Interstitial.
(3) Gummatous.
(4) Meningeal.
(5) Vascular.
(6) Optic atrophy, ophthalmoplegias.
(7) Meningo-vascular.
(8) Meningo-parenchymatous.
(9) Any combination of two or more of the above.

In planning treatment factors which should be properly weighed, and constantly kept in mind by the physician, are given in *Table VII.*

TABLE VII

Factors Determining Treatment

(1) Type of condition.
(2) Nature and amount of previous treatment.
(3) Age of patient.
(4) Duration of infection.
(5) Duration of nervous and mental symptoms.
(6) The patient's response to therapeutic procedures being used.

Until one can be reasonably sure of the type of the patient's condition, a conservative treatment which the physician can feel will be of some therapeutic benefit, and which will aid a more specific treatment for the individual and his individual condition, is given in *Table VIII.* There are many patients who cannot at first undergo malaria or protein fever therapy; and at the beginning of the treatment, it is only in the exceptional case that neo-arsphenamine does not aggravate the nervous and mental symptoms. Many patients are able to take the treatment outlined in *Table VIII* when they can take no other, and many patients are brought back to such a physical and mental state that they can take more strenuous treatment, as fever therapy, arsphenamine series, and intraspinal or intracisternal therapy.

TABLE VIII

Conservative Early Plan of Treatment
(Course of 6 to 12 Weeks)

(1) Procedures of Group A:
  (1) Routine method of living, i. e., regular hours of eating, sleeping, resting.
  (2) A constant environment with no excitement.
  (3) Freedom from all responsibilities.
  (4) Freedom from all worries, as much as possible.
  (5) Contentment and quiet if possible; hospitalize if necessary.
(2) Spinal drainage on alternate weeks.
(3) Tryparsamide, 2 to 3 grams weekly.
(4) Mercuric cyanide, 1 per cent 10 to 30 minims, or bismuth preparations biweekly.

TREATMENT

The serum used is arsphenamized, prepared essentially by the Swift-Ellis method. The patient is given 0.9 gram of neo-arsphenamine intravenously, from 15 minutes to one hour later, 40 to 60 c. c. of whole blood is removed, permitted to clot, centrifuged and clear fluid pipetted off. Just before using this fluid, it is inactivated in a water bath at 56° for 30 minutes. On the morning of treatment, breakfast is omitted, the patient is given ¼ grain of morphine, and 1/150 grain atropin hypodermically. The

No.	Name	Type	Dura Sympt.	Amount and Nature of Previous Treatment	No. of Cist.	Sp. Wass. 1 c. c.		Notes
						Fore	Aft.	
1	B. E. B.	Interstitial	3 Yrs.	Tryp., sp. drainage, neosal., mercury and bismuth. (3 yrs.)	10	4 Plus	1 Plus	At home; working; in good physical and mental state
2	R. D.	Paresis (Mod. advanced)	3 Yrs.	3 yrs: Sp. drainage, neosal., mercury, bismuth and Swift-Ellis	10	4 Plus	(?)	At former occupation; good physical and fair mental state
3	W. F. L.	Paresis (Mod. advanced)	2 Yrs.	2 yrs: Sp. drainage, neosal., mercury and bismuth	7	4 Plus	4 Plus	At home: Working; in fair physical and mental condition, spinal fluid not checked on in 8 weeks
4	J. F. D.	Early meningo-vascular	3½ Yrs.	3 yrs: Of tryp., sp. drainage, neosal., mercury and bismuth	5	4 Plus to 3 Plus	Neg.	Working successfully at former occupation: Good physical and mental condition
5	B. M.	Early paresis	4½ Yrs.	4 yrs: Swift-Ellis, tryp., sp. drainage, neosal., mercury and bismuth	4	4 Plus to Neg.	Neg.	Working successfully at former occupation. Good physical and mental state
11	S. J.	Meningo-vascular (perhaps gumma)	18 Mos.	1 yr: Occasional sp. dr., tryp., neosal., mercury and bismuth	8	4 Plus	4 Plus to weakly pos.	Much improvement mentally. No physical deterioration. At home doing some farm work
15	C. H. D.	Interstitial cerebrospinal	1 Yr.	1 yr: Protein fever. Spinal drainage, tryp., neosal., mercury and bismuth	7	Neg.	Neg.	Much improvement mentally. There had been little or no physical deterioration. Ready to return home
19	P. R.	Paresis (advanced)	3 Yrs.	18 mos: Sp. dr., tryp., neosal., mercury and bismuth, protein fever	4	4 Plus	Neg.	Home at work. Some dementia, but in good physical and mental state
21	R. B. A.	Paresis (Mod. advanced)	3½ Yrs.	2 yrs: Sp. dr., tryp., neoarsph., mercury, bismuth, malaria	3	4 Plus	Neg.	At home at work; marked improvement mentally and physically. Little dementia

neck having been cleansed, shaved, sterilized and properly draped, cisternal puncture is made, and, with the needle *in situ*, 20 c. c. or more of the fluid are withdrawn, usually permitting it to flow out of its own accord. The prepared serum is slowly injected by the syringe method. The first injection consists of 12 c. c. of the serum and 13 c. c. of warm normal saline. By the fourth treatment the entire 25 c. c. is composed entirely of serum, or, if desirable, a small amount of neo-arsphenamine solution, never more than 0.7 milligram, may be added. Immediately after the cisternal injection, 50 c. c. of saturated glucose are given intravenously.

The value of arsphenamine products is not only in their spirocheticidal effects, but also in the specific antibodies which they are supposed to produce by reaction with the patient's body tissues. Injection into the cisterna of this autoserum, to which neo-arsphenamine has been added, places in direct contact with the brain both the arsphenamine preparation and the specific antibodies. Intravenous injection of the hypertonic solution of glucose immediately after the injection of the serum with its arsenical and antibody content, is supposed to draw into the brain tissue some of the material injected into the cisterna. Saturated glucose is used because it has been proven to be non-toxic and to decrease intracranial pressure as well as any of the hypertonic salt solutions such as magnesium sulphate or sodium chloride. During the past year, 22 neurosyphilitic patients have had a total of 135 intracisternal treatments (*Table IX*). The greatest number that any one patient received is ten. Nine of the 22 have shown improvement in the Wassermann reaction of the spinal fluid with this small number of treatments. Six of the original 22 with general paralysis, having highly positive Wassermanns before treatment, have had a definite decrease in the strength of the positive reaction.

SUMMARY OF THREE CASE REPORTS

Case 4.—J. F. D., age 38, had meningo-vascular syphilis of three and one-half years' duration. When the symptoms first started he was given three weekly injections of neo-arsphenamine, and rapidly became more excited and restless. It was necessary to commit him to the State Hospital because of his nervous and mental condition. On tryparsamide and spinal drainage, he very quickly began to respond to treatment, and for the past two and one-half years he has been back at his former occupation. He has taken his treatment regularly, the treatment consisting of courses of six to eight weeks' duration similar to that reported in *Case 1*. The cell count and globulin rapidly approached normal, but the Wassermann reaction continued strongly positive. After five intracisternal treatments the Was-

sermann reaction has become, and remained negative. He successfully continues his work as insurance salesman.

Case 5.—B. M., age 28, in the real estate and insurance business, had early general paralysis. He developed neurosyphilis in the fall of 1924. He was placed in a private sanitarium for six weeks, where he received three Swift-Ellis treatments. He showed some improvement and was transferred to a state hospital, where he remained for three months, receiving a few irregular intravenous injections of tryparsamide and neo-arsphenamine.

He came under my care in June, 1925; was given five courses of treatment varying from six to eight weeks, consisting of 3 grams of tryparsamide weekly, spinal drainage on alternate weeks, mercuric cyanide (12 to 20 minims) intramuscularly, with rest periods of from five to twelve weeks' duration. He became much better mentally and returned to his former occupation.

His serological tests improved, except the Wassermann reaction, which remained highly positive in both blood and spinal fluid. Treatment was continued, substituting neo-arsphenamine (0.45 to 0.9 grams) and bismuth for the tryparsamide and mercury, respectively. This continued for three courses, when the blood reaction became negative, and has remained so. The spinal Wassermann varied from completely negative to 4 plus. Chronic arsenical dermatitis began to develop, and proper treatment was instituted. Six months later the spinal fluid had a normal globulin and cell count, but a 4 plus Wassermann, while the blood Wassermann was negative. A course of neo-arsphenamine and bismuth was given, with sodium thiosulphate intravenously, at the same time that the neo-arsphenamine was given. The spinal Wassermann continued to be 4 plus. Intracisternal treatments were given at weekly intervals, four times. The spinal fluid Wassermann has been negative the last three times it was examined. It is eight months since the last treatment, and he successfully continues his work in real estate and insurance.

Case 19.—P. R. had advanced general paralysis. The patient was thirty-six years of age, having had mental symptoms for two and one-half years. He responded well to tryparsamide and spinal drainage, mercury, bismuth and neo-arsphenamine, but the spinal Wassermann was 4 plus at all times. After four cisternal injections the Wassermann reaction became negative, and has remained so. The patient is at home working on a salary, but cannot command the salary he formerly did.

SUMMARY AND CONCLUSIONS

(1) Intracisternal medication is a safe procedure. Because of the proximity of the medulla, careful study should be given to the landmarks and other important structures.

(2) Theoretically, because of its anatomical and physiological location, the cisterna cerebromedullaris is an important place for administering preparations in both acute and chronic conditions. It is a better place for administering auto-serum than the lumbar region, which is commonly used in the Swift-Ellis method.

(3) Intracisternal injections are valuable in the treatment of certain stages and types of neurosyphilis.

(4) Following the intracisternal injection for the treatment of neurosyphilis, hypertonic saturated glucose given intravenously should be beneficial.

DISCUSSION (*Abstract*)

Dr. Lewis M. Gaines, Atlanta, Ga.—The method of approach which Dr. Rayburn has described has certain peculiar advantages which have been in selected cases convincingly demonstrated since the introduction of the method about ten years ago.

On the part of many, there has been a certain amount of trepidation about the introduction of a needle so near the medulla. Such a fear is not without reason, particularly in cases which have a marked increase of intracranial pressure. Other dangers which have been emphasized by various writers are hemorrhage over the medulla from trauma to the spinal veins, as well as trauma to the medulla itself from too deep a puncture.

Anyone who proposes to undertake this method should by all means develop a safe technic by practice on the cadaver before he attempts to introduce a needle into a living subject.

There are, as Dr. Rayburn has described, many cases in which benefits will be secured and improvements brought about by this method after other procedures have failed, particularly in cases of meningitis. Not only does this method secure a better contact of the curative sera with the infected areas of the brain, but in cases which recover, there are less apt to be residuals, such as deafness, by the use of this method than by the introduction of the sera by lumbar puncture.

The use of cistern puncture alone in applying arsphenamized serum to cases of paresis has not fulfilled our hopes to any degree, although, as Dr. Rayburn reports, benefit may be occasionally secured. It would seem that the greatest field for usefulness in continuing the Swift-Ellis method would be following the malarial treatment in so far as paresis is concerned. My present feeling is that malaria should be used for all patients with early paresis who are physically able to undergo this infection, and that after a lapse of one or two months, further antisyphilitic treatment should be used, of which the Swift-Ellis may be considered one method. Its introduction by the cistern method is certainly worthy of trial, particularly if other methods have failed.

A good many years ago Solomon pointed out that a number of cases of paresis had been intensively treated by the Swift-Ellis method with a reduction to negative of all the syphilitic reactions of the blood and spinal fluid. Certain of these cases came to autopsy and showed the most extensive destructive changes in the brain, despite the negative serological findings.

Dr. William Nelson, St. Louis, Mo.—I have done a good deal of work with the Swift-Ellis method, and also with diathermy. If you follow those patients over a long time, and if you carefully analyze them, their cure or economic efficiency is going to depend very largely upon the kind of vocation they report. It is phenomenal that Dr. Rayburn reports splendid results with an insurance writer. We have been treating architects and persons making large realty developments, and I should not like to risk their judgment on anything I was interested in.

We used to treat our patient to improve his serological reaction. I do not do it any more. They have improved to a negative test, but they have been dying all the time.

Dr. H. D. Allen, Jr., Milledgeville, Ga.—I undertook at one time to compare the Swift-Ellis treatment, the arsphenamine and fever treatment. These three types of treatment, in the hands of their enthusiastic supporters, give an almost identical percentage of recoveries or improvements. I have been combining the fever treatment, typhoid vaccine and arsphenamine, and I have been able to render some sera and spinal fluids negative; but where a higher order of social adjustment is required of the individual you never can trust him to make a complete adjustment outside of an institution, regardless of his serum reactions.

Dr. Rayburn (closing).—In closing, I wish to emphasize that intracisternal therapy has a place not only in the treatment of acute purulent infections of the subarachnoid spaces, but also in the treatment of some chronic conditions, as certain stages of neurosyphilis. If necessary, I treat the neurosyphilitic patient first with one form of treatment, then another. All of those methods which have been used and have a proven value, I utilize. I do try to individualize the treatment. When a positive Wassermann is obtained, you can feel reasonably sure that spirochetes are present. It makes one feel better when a negative Wassermann, instead of a 4 plus, is obtained. Now, if you can add two, three, or more years to an individual's life, you have done that much for him, and possibly for his family and society. I doubt very much that a cure is ever obtained, in the sense that the individual is free from spirochetes.

SUPRAPUBIC PROSTATECTOMY*

By EDGAR G. BALLENGER, M.D.,
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and
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In attending various urologic clinics in different parts of the country, it is noticed that widely variant methods are employed in the management of patients during and after suprapubic prostatectomy. The enthusiasm and persistence with which certain measures, or agents, are employed by some urologists is about as surprising as the extreme fear expressed by others concerning the same measures or agents.

To ascertain the extent to which this enthusiasm, or fear, is justified, and to obtain the consensus of opinion, a questionnaire was sent to 710 urologists, mostly members of the American Urological Association. Twelve questions were asked concerning anesthesia, hemorrhage, hemostatic measures, epididymitis, and so forth. We desire to express our deepest appreciation for prompt and courteous replies, which were received from 350. While this number represents only about one-half of the men to whom the questionnaire was sent, replies came from nearly all of the urologists in the U. S. A., who are performing many suprapubic prostatectomies. Most of the men not replying were those not doing much operative work and those who prefer the perineal method. The answers bring out the usual methods of dealing with some of the problems in suprapubic prostatectomy.

The following is a summary of the replies received:

Anesthesia.—One hundred twenty-seven preferred gas oxygen, 85 preferred spinal anesthesia, 58 sacral, 48 ethylene, nine ether, and five local infiltration.

Hemorrhage.—To control hemorrhage, measures such as bags, packing and suturing were employed by 225. Of this number 70 used one or more of these hemostatic measures in more than 50 per cent of their patients; eight in from 1 to 10 per cent; 17 urologists employed no hemostatic measures other than careful enucleation of the gland; 156 used bags of some kind; 94 used packing with gauze; 14 sutured or ligated bleeding points and also inserted a bag; 13 used hot gauze packs for a few minutes; ten sutured the capsule and then packed with gauze; ten sutured the prostatic capsule only; ten used no measures except blood clotting agents, such as thromboplastin, or coagulin; four, blood transfusions; two, massage of the prostatic capsule; one used a compression clamp.

Unexpected Bleeding.—Two hundred and sixty urologists stated that unexpected bleeding occurred in from 1 to 10 per cent of their patients; 45 in from 10 to 50 per cent; eight stated that unexpected hemorrhage came in more than 50 per cent; and 24 stated they observed no unexpected bleeding.

It was interesting to note that those who encountered little unexpected bleeding were nearly all among the urologists who used bags or packing as a routine.

Amount of Blood Lost.—Answers to the question as to the amount of blood the average patient could lose without materially increasing the danger of shock, anuria, uremia, or pneumonia, varied from 2 to 32 ounces. The average was 11 ounces.

Amount of Traction on Bags.—Answers to the question as to the amount of traction to be used when bags were employed showed that 21 urologists inflated the bags but did not apply traction; 67 employed 1 to 3 pounds of traction; 46 applied 3 to 5 pounds; five stated that they employed more than 5 pounds; 42 could give no estimate as to traction because of the employment of cages or other means of traction which could not be calculated in pounds.

One urologist was experimenting with a device to regulate, in millimeters of mercury, traction so that it would exert pressure slightly more than the systolic blood pressure.

Removal of Suprapubic Drainage Tube.—After second stage prostatectomy, 136 urologists removed the suprapubic drainage tubes in from one to five days; 96 in

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from five to ten days; 47 in from ten to 14 days; 37 did not use drainage tubes after second stage prostatectomy; eight closed the bladder and employed indwelling catheters for drainage.

Extent of Closure of Incision After the Second Stage Operation.—One hundred and twenty used no sutures in the bladder after second stage prostatectomy; 202 closed the bladder around the tube; 196 closed the skin, fascia and muscle in separate layers; 103 employed only through and through silkworm gut sutures; 23 made no attempt to close the incision after the second stage operation.

Time Required for Incision to Heal.—After one stage operations, 111 average three to four weeks for healing; 96 average two to three weeks; 29 claim one to two weeks; 18, four to five weeks; six, five to six weeks, and 27 said one to four weeks.

After Two Stage Prostatectomies.—One hundred and fourteen report three to four weeks as the average time required for healing; 75 claim two to three weeks; 19, one to two weeks; seven, five to six weeks; 21 give over six weeks as the average; 24, from one to six weeks.

From these figures it is evident that the average time required for healing varies comparatively little, whether it be done in a one or a two stage operation. The great majority of urologists find three to four weeks the average time in both operations. Furthermore, the healing time varies very little, whether the incision is closed in layers or by through and through sutures.

Vacuum Devices to Keep Patients Dry.—One hundred and seven employ vacuum devices to collect urine and keep patients dry after removal of suprapubic tubes; 210 use no suction devices; 185 employ urethral catheters, while 142 do not.

Catheters.—Of the men who use catheters, 103 find epididymitis as a complication in from 1 to 10 per cent; 80 in from 10 to 25 per cent; 63 in from 25 to 50 per cent; eight in more than 50 per cent; 87 do vasectomy as a routine to prevent epididymitis.

DISCUSSION (*Abstract*)

Dr. W. Houston Toulson, Baltimore, Md.—To my mind, there can be no standardization of this subject; each case brings its individual problems.

I prefer packing the prostatic capsule with gauze. I feel that it is essential to get a good exposure and to look at the prostatic bed in dealing with the hemorrhage. I feel very much more comfortable knowing that I have a firm gauze pack in the bleeding area.

There is such a wide variation in the configuration of the prostate and the bed is so distorted that I could never see how a rubber bag would fit down snugly enough into the capsule with enough pressure to take care of any active oozing. I have used a bag very little.

Infections in the urinary tract influence us a great deal in the treatment. There is a difference in the amount of bleeding if there be a heavy infection in the bed and in the prostate. I believe in irrigations after the removal of the prostate. There is a certain amount of detritus and necrosis around the field of operation which I believe is cleared by thoroughly irrigating through the urethra. I also believe in the use of a large suprapubic drainage tube and I should like to ask Dr. Ballenger what size tube he uses for that purpose.

Dr. Ballenger.—Just about as big as your little finger.

Dr. Toulson.—I feel that with a large drainage tube to take care of what blood clot and infection may be left, you are less apt to have bladder tenesmus and consequently less apt to have pressure on the prostatic bed with bleeding.

Dr. H. W. E. Walther, New Orleans, La.—I would like to make a plea for the transverse incision in doing cystotomies, especially in very obese patients. I do not know the experience of others, but I have had a number of hernias following my suprapubics. Since I have used the transverse incision I have not seen a single hernia. I use a bag in every case, and I would not do a prostatectomy without using a bag. I use the large sized bags; they will fit any capsule. For the very large prostate I dilate that bag with water to maximum, and where I have a small prostate I use less distention.

Dr. A. J. Crowell, Charlotte, N. C.—I think it wise to get gas cystograms as a diagnostic procedure in cases of hypertrophy of the prostatic gland. We find this very desirable when the patient first comes to the clinic in order to get an idea of the size of the prostate, as well as to bring out stone shadows in the bladder if they are present. We do not think it wise to cystoscope a patient on admission, especially if he has a large prostate and a great amount of residual urine. It is our habit to withdraw the urine, get a cystogram and replace quickly about the same amount of boric acid as we have withdrawn urine. The patient usually has but little reaction. The air should be injected under low pressure, not more than 10 mm. If the ureters are dilated the air will regurgitate into the kidney pelvis and give us desirable information.

I have had but little experience with the bag, but theoretically it should be very fine. In addition to controlling hemorrhage, it will fasten the capsule in position and hasten healing.

Dr. W. J. Wallace, Oklahoma City, Okla.—Dr. Ballenger's prostatic bag I think quite an improvement over some of those which I have been using. For the last year I have used this bag in my private work as it is very light, collapsible and can be removed through the urethra. However, to do this, I frequently have to do a meatotomy, especially when the meatus is very small. It is my plan to release the water and tension about eight hours following prostatectomy, but seldom remove the bag until the third day. Since this bag is so light, leaving it in the bladder does no particular harm, and if a hemorrhage should occur I can readily control it by again filling the bag and applying tension.

Dr. C. C. Higgins, Cleveland, Ohio.—Instead of packing the prostatic cavity with gauze or depending upon the hemostatic bag to control postoperative hemorrhage we now obliterate the cavity in cases of prostatectomy, as is advocated by Lower.

One point can not be over-emphasized, and that is the necessity for the absolute control of hemorrhage before closure of the bladder.

To obliterate the prostatic cavity, as a general rule, three sutures are applied above the catheter, and only one below. In this manner an elevation of the bladder neck is not produced. The bladder is then closed completely and we rely on the catheter for drainage. The bladder is then irrigated every fifteen minutes with boric solution.

About 70 per cent of the bladders which are closed completely heal by primary union. Of course, if marked infection of the bladder is present and can not be eradicated by pre-operative drainage and irrigation, we do not attempt primary complete closure of the bladder.

By primary closure of the bladder the patient's stay in the hospital is shortened by an average of eight days.

Dr. H. N. Dorman, Washington, D. C.—I was surprised to learn from Dr. Ballenger's statistics of the number of physicians who are still doing prostatectomies under straight ether anesthesia. To my mind, the selection of an anesthetic is of great importance in performing this operation. We have all been obliged to use ether anesthesia in days gone by. With the recent progress in anesthesia, nitrous oxide, ethylene and, finally, infiltration anesthesia have been used, and have produced a decline in the mortality in this particular operation. At the present time, we are using spinal anesthesia routinely and find it most satisfactory. The advantages of regional anesthesia over any form of general anesthesia and especially ether ought to be so apparent to the urologist as to preclude any consideration of the latter in prostatectomy.

Dr. Ballenger (closing).—While air cystograms are of great value, they should not be employed when there is hematuria, when bleeding is caused by the passage of the catheter, or when the procaine solution, previously injected, returns bloody.

Suture of the prostatic bed to control hemorrhage after prostatectomy, is easiest to accomplish when least needed. When, however, there is much bleeding and when hemostasis is badly and promptly needed the difficulty of placing the sutures is proportionately increased. In the hands of a skillful operator, like Dr. Lower, the sutures may be placed sufficiently promptly to avoid dangerous loss of blood or time. For the average urologist the method is likely to result in more loss of blood and time than the advantages of the sutures justify. Furthermore, this plan does not control bleeding in the urethra and can not be employed satisfactorily in two stage operations. From the questionnaire it was found that a large percentage of urologists who employ the suture method also use the hemostatic bag.

CHOLECYSTITIS AND CHOLECYSTOGRAPHY*

By HUGH SMITH, M. D.,
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Because so many men of my acquaintance still express an antipathy for the use of tetiothalein intravenously, I feel that a review of my experience may be of some value. One-third of our patients present themselves with digestive complaints and a large proportion of these have gall-bladder disease.

The Graham-Cole method of gall-bladder visualization has been used in my office for four years. At first we gave the dye in capsule and tablet form to several patients, but we were so dissatisfied with both the results and the reactions that this method was abandoned for the intravenous route. Oral methods have been improved since we discontinued this procedure, but after our experience with the dye intravenously we have never considered its use in any other manner.

We have studied 150 patients with the dye intravenously in the past four years. During this time we saw 371 new cases presenting digestive disturbances as their chief complaint. We have used the dye in 40 per cent of these cases complaining of dyspepsia. In this series a diagnosis of gall-bladder disease has been made 94 times, or in 26 per cent. In our experience gall-bladder disease is by far the most frequent organic cause of indigestion. Blackford and Dwyer,[1] analyzing 1,650 cases of dyspepsia, reported that the relative frequency of organic disease causing gastric symptoms was: gastric ulcer, 1; cancer, 2; "reflex" appendix, 4; duodenal ulcer, 6; and gall-bladder disease, 12. In our smaller series we have found very similar results, except that the appendix is as frequent a cause as duodenal ulcer.

In 1924, when Graham and Cole published their work on cholecystography, they brought out a technic that was promptly and widely accepted. As a result the liver and gall-bladder became the subject of widespread investigation and many discoveries concerning their physiology and function were soon made. The old idea that the gall-bladder was simply a reservoir for the storage of bile between demands was no longer tenable. Several functions were ascribed to it.

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Two of these are now fairly well understood and their importance realized. The normal gall-bladder certainly has as one function the concentration of bile. This is done by absorption, and normally the liver bile is concentrated twenty to thirty times by the gall-bladder. This function of absorption is very important, and so long as the gall-bladder is capable of this duty, its removal causes distress. If disease has so altered the gall-bladder mucosa that it no longer actively concentrates bile by absorption, it appears that the intra-hepatic ductal system has gradually enlarged itself until it is able to carry on this work. In other words, where the function of absorption has been gradually lost by disease, the liver and its ducts have as gradually established compensation. The removal of a gall-bladder under these conditions is very satisfactory. This probably explains why patients with very bad gall-bladders do better after cholecystectomy than do those whose involvement is less marked.

Another important function of the gall-bladder is contractility, whereby it is able to empty itself on demand. There are several theories as to how this is done, and it seems that there are several factors concerned. Histologically there is a fibro-muscular coat in the gall-bladder and it seems reasonable to assume that this musculature has the usual function of muscle, that is contractility. The work of Ivy and Oldberg[2] offers interesting thought. They have apparently isolated a hormone which they call cholecystokonin. In its general action this hormone might be compared to the better known one, secretin. Ivy and Oldberg seem to prove that cholecystokonin excites the gall-bladder to empty itself when bile is needed for duodenal admixture. The Lyon method of duodenal drainage is based on the law of contrary innervation offered by Meltzer. This law may also be a factor in the normal emptying of the gall-bladder. Sweet[3] believes that the gall-bladder has as its only function absorption, and that normally bile does not leave the gall-bladder through its ducts. The experiments of Copher and of Whittaker apparently prove otherwise. By tying off the cystic duct of a dye-filled bladder they have been able to obtain radiographic shadows for several days, and have then shown that the shadows promptly disappear on releasing the cystic duct and giving a fat meal.

The symptoms of gall-bladder disease are quite familiar. The explanation offered by Alvarez and described as the "reverse peristalsis syndrome" by him seems logical and satisfying. He describes these symptoms as a sense of fullness as soon as eating is begun, belching, heartburn, a sense of back pressure against the diaphragm, coated tongue and vomiting. Certainly these are the common symptoms reported by this group of patients. While they may be present in functional dyspepsias, a diagnosis of organic disease in their absence is uncertain. Alvarez explains this distress with the theory that a diseased gall-bladder fails to perform one or more of its several functions. Its ability to concentrate bile is impaired, and it is either partially or totally unable to empty concentrated bile into the duodenum. Thus, when the gastric chyme, normally quite acid, is propelled into the duodenum, it is imperfectly neutralized. This results in duodenal irritation and defensive spasm, setting up reversed peristalsis, with a sense of a lump in the epigastrium and a sense of a failure of foods to move on, even to regurgitation. Kodama,[7] studying the lymphatics of the dog, found that the lymphatics of the under surface of the liver, the gall-bladder and the first portion of the duodenum are all intimately associated. It appears that the lymphatics from the lower right abdomen are also intimately related to those of the under surface of the liver. We can readily expect, therefore, infection of one or the other of these parts to involve the others.

Graham[4] states that the proportion of gall-gladder disease in women is twice that in men. My series shows the diagnosis made in 61 women and in 33 men. Graham also says that in women who have been through several pregnancies, the gall-bladder is usually impaired. Alvarez[5] after a review of 60 cases of gall-bladder disease proven by operation, found that the average duration of symptoms was nineteen years. He concluded that many cases of cholecystitis begin in childhood. Graham says that they have found a surprisingly large number of diseased gall-bladders in children. In my series the youngest patient to come to operation was fourteen, and this girl had a definitely diseased gall-bladder. She has been markedly better since its removal.

One thing of interest here is an explanation of the pains frequently referred to the shoulders in this disease. Dowman[6] has apparently demonstrated the presence of sensory fibres in the phrenic nerves. I have seen him produce sharp pain in the right shoulder blade area by

stimulation of the exposed right phrenic nerve. The description of this pain by the patient is identical with that which we are used to associating with gall-bladder disease. I have seen this same experiment repeated and confirmed by Dr. T. B. Reeves on another patient on whom a right phrenicotomy was done.

In the discussion of the recognition of gall-bladder disease I am, of course, admitting the obvious diagnoses and refer only to those where an accurate diagnosis requires special investigation. Of the methods at our command, the radiographic investigation by means of the intravenous injection of tetraiodophenolphthalein sodium, offers us the most information. This dye is 60 per cent iodine by weight and it is quite well tolerated intravenously in dilutions of 8 per cent or less. It is irritating to the perivascular tissues; but so are other commonly used solutions, such as neo-arsphenamine.

We have found that the dye is best given by gravity. The needle should be small enough to prolong the time of injection over a period of fifteen minutes. Our technic has given us consistently good results for four years.

The dye is prepared the afternoon before it is used. We believe this has some advantage and I am sure that there has been less irritation to the veins since this was begun. For the injection we use a Kaufman-Luer syringe connected by 15 inches of rubber tubing to the barrel of a 50 c. c. asepto syringe. The tubing and small syringe are filled with sterile saline and the previously prepared dye is then poured into the cylinder above. After this flows in, about 20 c. c. of saline are added to wash the vein clean. With this technic I have seen only one reaction of any severity. This one occurred in a man who took several drinks the night before, without our knowledge. All of our work is done in the office. The patient is given the dye at 9 A. M. and left on a bed for an hour. He is then allowed to go about his business until the radiographs are made five and eight hours after injection.

On the day of the test, he is allowed only orange juice and coffee without cream for breakfast; a cup of coffee or tea without cream for lunch, and then after the second picture he is instructed to eat his usual supper and breakfast the following morning. Two hours after breakfast a third plate is made to determine the ability of the gall-bladder to empty. In the early part of our experience with this dye our opinions were largely formed on the degree of concentration found in the five and eight hour films. We could see no advantage in having the patient fast until a twenty-four hour view, so adopted the method as outlined above. This technic has proven so simple in my office that I can see no possible objection to the intravenous method, if one is at all adept in intravenous technic.

Graham strongly advises the use of the dye intravenously for cholecystography. He offers four factors which are obviously necessary for the production of a shadow. First, the dye must be so given that it has access to the liver. When given by mouth there is always a question as to the rate and amount of absorption. Reactions in my experience have been more distressing. Given intravenously a definite amount is made available and there is no doubt of its access to the liver. Second, having made the dye accessible, the liver must be able to secrete it into bile. Third, after it is secreted into the bile the cystic duct must be patent so that it can reach the gall-bladder. Fourth, with the above factors all satisfactory, the gall-bladder must be able to concentrate the bile sufficiently to produce a shadow. Considering these factors necessary for the production of a cholecystogram, we see that this method offers certain functional conclusions. It determines the patency of the cystic duct, the ability of the gall-bladder to concentrate and finally the ability of the gall-bladder to empty itself.

The accuracy of cholecystography carried out as above described is very satisfactory. In our series of 150 dye studies, we have considered 94 as pathological. Fifty of these have been operated upon and our diagnosis confirmed in 48. Thus the preoperative diagnosis has been confirmed by the surgeons in 96 per cent of cases. The two errors were both found to have duodenal ulcers. These two cases were studied by both barium and dye and the diagnosis should have been made. We obtained good filling and concentration at all periods, but both failed to empty after fat meals. In retrospect, I believe this failure to empty was due to pylorospasm with prolonged gastric retention of the fat meals. Neither of these cases had a six hour residue when the barium was given several days before the cholecystographic studies. In addition to these 50 cases operated upon with a diagnosis of diseased gall-bladder, we have had five other patients operated upon for other abdominal conditions, who had been studied by the dye method and whose gall-bladders were considered normal. The surgeons have agreed that these gall-bladders were apparently normal on inspection and palpation.

In this operative series, stones have been found in twenty cases, or 40 per cent. We had been able to recognize only about half of these in the films, though in the histories of colic and with failure of the gall-bladder to show, we anticipated some of these. It had been my belief for years that cholecystitis was commonly associated with definitely low gastric acidity. This small series does not confirm that belief.

In only two cases was there an achlorhydria, and in twelve others the gastric analysis might be considered low. In eight cases there was a high gastric acidity and in the remaining cases the level was within average limits.

In this series, 70 per cent of the pathological gall-bladders occurred between the ages of forty and sixty, which is the usual age group for this condition.

Cholecystectomy was done in 45 of the 48 operations. One patient was drained when we thought the removal of her gall-bladder was indicated. A year later she had a return of her original symptoms, though for about ten months she was a great deal better. The other two cases were operated upon under acute conditions, where drainage seemed the operation of choice. Three of these patients failed to recover. Two of these, the ones drained as described above, were very poor risks and were operated upon with this knowledge. The only unexpected death was due to pneumonia a week after operation upon a man who was a splendid apparent risk. Since operation there have been two other deaths, one of cancer of the gall-bladder, which was found at operation in the earliest stage I had ever seen one, though even then there was definite involvement of the neighboring lymph nodes. This patient lived six months after his operation. The other death was due to an entirely unrelated cause.

Medical and dietetic control after cholecystectomy is very important. It is my belief that we can do more for these patients after operation along this line than before operation. Simple diets, restricting the heavy starches, the fried foods, gravies, and pastries will keep these cases more comfortable after operation, if followed for a year. It is my custom to prescribe a grain of calomel in quarter grain doses taken at half-hourly intervals once a month for a year. This is followed by a saline the following morning. I am quite certain that since we have followed our post-operative cases more carefully, our results have been much better. It is only reasonable to believe that the liver and its ductal system will require several months to establish complete compensation in the absence of the gall-bladder, particularly where it has been removed for early or moderate damage.

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MASSIVE GASTRIC HEMORRHAGE WITH NORMAL ROENTGEN RAY FINDINGS*

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Before discussing the possible causes of gastric hemorrhage without demonstrable lesion, it is well to review the usual known causes:

(1) Local organic lesions:
  (a) Ulcer.
  (b) Carcinoma.
(2) Mechanical conditions:
  (a) Trauma:
    External violence.
    Internal surgical.
  (b) Ruptured aneurism.
  (c) Arteriosclerosis and varicosities, cirrhosis, acute yellow atrophy.
  (d) Passive congestion from obstructing bands.
(3) Constitutional and toxic diseases, local and general:
    Splenic diseases.
    Leukemia.
    Hemophilia.
    Yellow fever and malaria.
    Phosphorus and other poisoning.
    Blood infections.
    Vicarious menstruation.

As early as 1803, Dalche[8] mentioned the possibility of gastric hemorrhage without demonstrable lesions. In 1815, Latour[19] published a book in Orleans, "Histoire Philosophique et Medicale des Hemorraghies," recognizing such cases, and reporting others reported by Portal, Franck, Hoffman, Van Swieten, Baldinger, and Warton.

In 1906, White[34] reported 29 cases proven negative by operation or autopsy.

In 1914, Deaver[9] published a paper describing chronic focal infection, local or remote (most often gall-bladder or appendix), as the cause of these mysterious hemorrhages.

In 1915, Rosenow[30] showed the association of various streptococcus infections with bleeding from hemorrhagic points and superficial ulcers of the stomach.

In 1915, Eusterman[13] said that 5 per cent of the gall-bladder, and 2 per cent of the appendix infections, studied at the Mayo Clinic, caused gastric hemorrhage.

In 1916, Moschchowitz[24] published four cases with no lesions detected at operation.

In 1916, Smithies and Bowen[33] described five cases of gastric hemorrhage at the menstrual

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period where no cause was found at operation.

Crispin,[7] in 1917, stressed the toxic factor.

In 1917, Outland and Clendening[27] described an appendix, buried in a mass of adhesions, which gave rise to a stream of infection carried up the omentum.

In 1918, Drybrough-Smith[12] suggested the toxic origin of gastric hemorrhage rather than faulty technic after appendectomy.

In 1920, Nicolaysen[25] suggested the nervous cause. He cited Finzi's[14] experimental removal of parts of the suprarenal glands in rabbits and dogs, with subsequent hemorrhage.

In 1924, Monod[23] carefully reviewed the literature and reported three cases.

In the same year Bevan and Eiselberg[4] suggest thrombosis of abdominal veins as the cause of post-operative gastric hemorrhage.

Friedenwald and Wiest[15] suggest the sudden rupture of arteriosclerotic gastric vessels.

In September, 1928, Sante[31] read a carefully prepared paper stating that he regarded a simple engorgement of the blood vessels as an insufficient cause for hemorrhage. He credits the work of Auer[2 3] and believes this hemorrhage an anaphylactic manifestation. I quote freely from their papers.

In substantiation of the theory of the nervous control of hemorrhage, Godel[16] found no gross lesions in an old woman who died of massive gastric hemorrhage. But microscopic sections showed degenerations of the cervical and celiac ganglia, and also extensive arteriosclerosis and miliary aneurysms. He quoted five similar cases.

Monod[23] questions the answer but leans toward some nervous disorder as explanation. The French gastrologist Mathieu[19] describes two varieties: (a) hysterical, and (b) emotional. He records the case of a man who, upon hearing the report of a gun, had a profuse hemorrhage.

The research work of Professor Latarget[19] of Lyons may throw some light upon the subject. He performed many resections of the nerves to the stomach in cases of gastric crises of tabes. He found experimentally that resection of the proper nerves of the stomach is followed by marked vasodilatation of the vessels of the gastric wall, omentum and peritoneum, going so far as ecchymosis. The mucosal vessels did not partake in this phenomenon. These latter must be under control of local centres, but we do not know at present the tract followed by afferent nerves. Monod[23] feels that gastric hemorrhage is due to some perturbation of the normal reaction of the general nervous system on the visceral system, and he supposes that there are local circuits regulated by, and possibly disturbed by, neighboring organs. Thus, he explains hematemesis in cases of appendicitis and cholecystitis.

Muller[19] has located the sympathetic vasomotor centres in the tractus intermedio-lateralis of the medulla. Recently Castex[19] at the Academy of Medicine in Paris showed that the same centers control vasotrophicity. Monod[23] feels that it is not illogical to attribute gastric hemorrhage to disturbances of these centers, ganglia, or nuclei.

On the other hand Auer[2 3] feels that since he can produce gastric hemorrhage in guinea pigs, rabbits and dogs as a result of anaphylactic reaction, this may be the basis of a similar reaction in man.

He has shown that guinea pigs sensitized to horse serum may bleed from the stomach when further injection of the sensitizing proteid is administered, producing anaphylaxis. The lesions described are first short superficial linear or star-shaped brownish erosions of the mucosa, in the middle third of the stomach. There is no blood in the erosions or in the gastric contents. In the next stage hemorrhages of peculiar structure and variable extent were noted. These consisted of small disc-shaped masses of blood, more or less superimposed one upon another. Upon removal of the hemorrhage linear erosions were disclosed, the extent of which was less than would be expected from the amount of the hemorrhage. The same disproportion between the large hemorrhage in certain duodenal ulcers has led Paterson[21] and others to believe that the stomach must be the source of most of the blood.

Extreme dilatation was noted in many, but not all of the mucosal capillaries. This was most marked in the middle third of the stomach, and nearest the areas of hemorrhage. These vessels showed markedly dilated and constricted sections. This dilatation and constriction is caused by peristaltoid movements in the vessels, which impede or prevent blood supply to these areas, resulting in localized areas of asphyxia. In such areas the protective mechanism of the body is lost, and autodigestion takes place.

Auer[2 3] has further shown that if a subliminal dose is again given to a rabbit which has been sensitized to horse serum, and while the serum is circulating in the blood an irritant, xylol, is applied to the ear, a local hemorrhagic anaphylactic reaction occurs. This reaction is interpreted as being the result of local auto-inoculation in a sensitized rabbit. The sensitizing agent, circulating in the blood, is carried in excess to a single locality, the ear, which is congested from the irritant. A subliminal concentration of antigen for non-inflamed sensitized cells may thus become effective when inflamed sensitized cells are concerned. It is possible that this interplay of conditions may explain a number of functional abnormalities in the human subject. It is theoretically possible, therefore, that chronic infection of the appendix, gall-bladder or diverticula of the intestinal tract may produce sensitization in the individual to these

products of bacterial growth. Such an individual may, by the intermittent dumping of the same infectious material into the intestinal tract, reinoculate himself. The dose thus administered is subliminal, and insufficient to produce a generalized anaphylaxis, but can result in a localized reaction at the point of irritation produced by the constant discharge of pus into the intestinal tract.

Weight is added to this theory by numerous cases which have been reported. Sante[31] reports a woman, who, after experiencing a violent urticaria, vomited large quantities of blood. Thorough examination was negative. Cases of diverticula by Sante[31] and Robineau,[29] of obstructing bands by Duval and Roux,[35] and also by Landenois,[36] all of which were cured of further bleeding by surgical correction of these faults, have been reported. The more common bleeding caused by a diseased appendix or gall-bladder has probably occurred in the practice of most of you.

SUMMARY

(1) The most common source of gastric hemorrhage is from an organic lesion.

(2) When no organic lesion is found it is probably an anaphylactic manifestation.

(3) Toxic foci should be eliminated in all these patients.

(4) Vicarious menstruation should be considered as a possible cause.

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DISCUSSION (*Abstract*)

Dr. Alfred L. Gray, Richmond, Va.—Roentgenologists always feel better when they can demonstrate some very definite lesion. It makes us feel that we have done something, even if we have done nothing but discover an inoperable carcinoma. I have had many cases such as Dr. Drane has described, of terrific hemorrhages, in which we could demonstrate no lesion whatever.

Even though we are unable to diagnose duodenal or gastric ulcer, it is well to exclude these things as possibilities in our gastro-intestinal examinations, and then the clinician can hunt for other causes for the so-called idiopathic hemorrhages.

Dr. J. M. Hoffman, Pensacola, Fla.—In idiopathic hemorrhages, a routine cytological examination of the blood should be made. The pathologist will frequently find some definite blood changes, particularly in the number of platelets and content of thrombin and prothrombin. A disturbance of any one of the factors entering into the normal coagulation of the blood may be found to be the cause of these hemorrhages. These disturbances should be eliminated when no roentgenologic evidence of gastric disease can be demonstrated. I have been doing some work on the effect of radium in treating mucous membrane hemorrhages, a preliminary report of which will be published shortly in *Radiology*.

Dr. Narcisse F. Thiberge, New Orleans, La.—A patient treated by me had chronic appendicitis, gastric ulcer, and at the same time allergy to many foods. Hence we can conclude the essayist is correct in explaining the hemorrhage in certain cases on the basis of anaphylactic manifestation.

Dr. Fred M. Hodges, Richmond, Va.—I have had a number of these cases and have been particularly interested in them. Where we have hemorrhage from an ulcer it is due to erosion of a vessel, and if it keeps up we have a surgical case. In other cases, whether due to anaphylaxis or not, there are vasomotor changes, and little punctate areas as a rule are present all over the stomach. In those cases I believe it is the duty of the roentgenologist to see the surgeon and go over the case thoroughly, because the treatment is very different in the two types of cases. As a rule, the bleeding from these little punctate areas is controlled by transfusions. If the surgeon knows there is one bleeding spot he can go in quickly and stop the hemorrhage. If we have a massive hemorrhage with no demonstrable pathological condition, it is our duty to follow the case a little further than we would ordinarily. If we have been

able to make a thorough examination we ought to insist that these patients not be operated upon.

Dr. Bernard H. Nichols, Cleveland, Ohio.—Although the subject of gastric hemorrhages without demonstrable radiological lesions leaves but little room for radiological discussion, nevertheless, it is interesting to the radiologist because of the number of these cases which come to him for examination.

The radiologist's attitude towards patients who recently have had massive gastric hemorrhages, and who have been referred to us for examination, is very important. Since we should, if possible, determine whether the patient has a demonstrable lesion, we are compelled to make a radiological examination in the majority of cases. A patient whom we examined recently was found to have a large gastric ulcer on the posterior wall of the stomach, and died within twenty-four hours from a perforation. The barium was found in the abdominal cavity. This examination was made with extreme care and with the smallest amount of manipulation.

Dr. Smith, of Chicago, contends that no patient should be examined radiologically within four weeks following a severe gastric hemorrhage. We feel, however, that a radiological examination should be made unless the cause of the hemorrhage can be determined by some other method. Of course, the utmost care and gentleness must be observed in making it.

Dr. Drane (closing).—This is not strictly a paper for the Roentgen Ray Section, but it is one that concerns us vitally. When we give these negative reports, we are always questioned. It is good to feel that we are not necessarily wrong. The anaphylactic theory, to my mind, is the best explanation. The only weakening point is that the lymphatics of the omentum traverse the transverse colon before they do the stomach. So, why is there not more hemorrhage from the bowel? Possibly, the thickness of its walls prevents much absorption.

THE CONSERVATIVE TREATMENT OF VARICOSE VEINS*

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Since the development of the hypodermic syringe in the middle of the Nineteenth Century, the injection treatment of varicose veins has had spasmodic waves of popularity which have been short lived largely due to faulty methods or to replacement by some new operative measure. However, it has been universally accepted that the operative treatment of varicose veins as a whole has been a failure, and the revival of the injection treatment is the result of a newer concept of the disease brought about by a more exhaustive research and study of the actual causes which precipitate it.

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No attempt will be made to review all that has been written upon this subject in the past two years, and we confine our remarks to a brief review of the injection treatment as applied to varicose veins of the lower extremity. In these cases, stagnated blood circulates throughout the veins of the leg, the result of dysfunction between the deep and the superficial venous plexuses. It is essentially a vicious cycle which may be easily corrected by this simple method of treatment. Where there is valvular insufficiency of the superficial venous system as evidenced by the engorgement of veins, the reverse flow of blood through this system can be arrested by obliterating these veins with some chemical substance which will cause an irritative endophlebitis, and the ideal reagent to use should be one which will cause the least perivascular irritation, yet will produce the desired effect within the vessel wall. There are many such reagents now in use, the most popular of which are as follows:

(1) Dextrose or glucose, 50 to 60 per cent solution.
(2) Invert sugar, 50 to 70 per cent solution.
(3) Quinine and urethane solution.
(4) Sodium salicylate, 20 to 40 per cent solution.
(5) Sodium chloride, 20 to 25 per cent solution.
(6) Bichloride of mercury, 1 to 3 per cent solution.
(7) Phenol in glycerine and water, 5 to 10 per cent solution.

We have obtained excellent and very gratifying results with the use of glucose in 50 per cent solution and quinine and urethane solution and believe that those who contemplate adding this work to their activities will find a greater degree of safety with their use than with the more toxic solutions.

The needle used should always be sharp and selected with care. An ordinary hypodermic syringe and needle are used for the injection of the quinine and urethane solution, but for the glucose solution a larger syringe and a needle with a larger bore will be found to be the most satisfactory. It must be remembered that intravaricose injection is much more difficult than ordinary intravenous injection. We usually inject from 3 to 5 c. c. of the glucose solution at a time, and as many injections as desired may be made, without fear, at one sitting. With the more toxic quinine and urethane solution, but 1 c. c. is used for the first injection to determine whether an idiosyncrasy to the drug exists. The dose is increased at each sitting and more than 4 c. c. in all is never used at any one treatment.

The ideal posture for the patient to assume is the one which will present the varix to best

advantage for the operator, and we find the sitting or the semi-recumbent position to be the most desirable. When the vein to be injected is obscured by thick skin and subcutaneous tissue, we sometimes inject with the patient standing.

We have devised a simple but practical vein occluder in the form of an old hard-rubber uterine pessary flattened by immersion in hot water, to which is attached a strong cloth belt. This occluder is fixed about the leg in a manner so that compression is made uniformly about the point of injection, thus minimizing the escape of the drug used. The injection is then made with the compression maintained from three to five minutes in order that the reagent may have sufficient irritative action to produce an obliteration. Where the varix is in close proximity to the prominent shaft of the tibia, pressure is made with the thumb and index finger of the left hand while making the injection and sustaining this pressure for an equal length of time.

After the injections are completed, the patient is allowed to rest a few minutes before leaving, and it is during this period that an elastic stocking or an ace bandage is applied as a supportive measure. Where there exists extensive ulceration, the injection treatment may be supplemented by the application of Unna's paste bandage. Subsequent treatments are made after an interval of from four to eight days.

It will be found that each varix will have an independent reactive power regardless of size or shape, and it is impossible to determine the manner in which obliteration will occur. Every injection point effects a sclerosis 5 to 15 cm. long and repeated injections into the same vein may be made without danger. Sometimes a definite thrombosis will occur, which evidences itself as a firm irregular swelling corresponding to the outline of the vein and extending from 1 to 3 cm. on either side of the point of injection. This is the result of a reaction within the vein, and differs from a septic thrombus in that it is extremely tenacious, and is eventually absorbed. The possibility of the thrombus' becoming the source of emboli is practically negligible.

Failure is oftimes encountered, particularly with the very large varicose veins which do not as a rule respond favorably to simpler solutions such as glucose, and it is in these instances that the stronger quinine and urethane solution is used effectively. Varices which extend well up on the thigh respond more favorably to this treatment if the saphenous vein, as well as its tortuous tributaries, are ligated and divided before any injections are made below. Where there exists a very large varicosity, the best procedure is to begin distally and obliterate the tributaries first.

We believe the injection treatment should be limited to varices of the lower limbs where there is evidence of valvular insufficiency, and where the varices are complicated with ulceration and eczema. We do not recommend injection of varices above the knee. We also wish to stress the importance of a careful physical examination. Especially is this urged with women where the existence of a pathological pelvic condition might well account for the presence of varicose veins, the result of a mechanical obstruction to the normal venous return from the legs. A few patients will present themselves with markedly tortuous varices extending well up the thigh and lower abdomen, denoting an obstruction to the deep venous plexuses. Such cases should be left alone. Also, phlebitis, arteriosclerosis, collateral varices of large dilatation, usually from obliteration of the deep venous network, early thromboangiitis obliterans, and advanced cardiac disease, are to be considered as contraindications to this method of treatment.

Accidents and complications are usually of a very minor degree and may be summarized as follows:

(1) Perivenitis or a third degree inflammation which subsides in a few days.
(2) Local pigmentation which subsides entirely in several weeks.
(3) Syncope at the time of injection, usually emotional.
(4) Perivascular injection.
(5) Pulmonary embolism, very rare.

Perivascular injection, or injection outside the vein, is perhaps the most important complication we have to deal with and nearly always results when very toxic solutions are injected into the subcutaneous tissues. A small localized, gangrenous area will soon appear, later sloughing away and leaving a deep crater-like ulcer which is very slow to heal.

SUMMARY

(1) The superiority of the obliteration treatment of varicose veins by the injection method has been clearly demonstrated, both in this country and abroad.

(2) The injection treatment is simple, conservative, and effective.

(3) This treatment can be administered in the home of the patient or office of the physician and entails practically no inconvenience or discomfort to the patient.

1801 Eye Street.

AGRANULOCYTIC ANGINA: REPORT OF A CASE*

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and
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The following case of agranulocytic angina is of interest on account of (a) its relatively long course, (b) its early recognition, (c) the failure of all suggested therapeutic agents, including x-ray, leucocytic extracts and repeated blood transfusions, and (d) the large number of blood counts and other laboratory tests performed.

A summary of 43 cases occurring during 1928-1929 similar to Kastlin's[1] review of 43 cases in 1927 is offered.

REPORT OF CASE

Mrs. M., white, female, a housewife, aged 51, was admitted to the Baptist Memorial Hospital May 6, 1929, complaining of sore throat and fever.

Her sister had died of chronic myelogenous leukemia; her uncle died of carcinoma of the throat; and her grandmother died of carcinoma of the eye.

Eight years previously she had a severe attack of measles, lasting three weeks and leaving her with a weak heart. She had had frequent attacks of tonsillitis during childhood. The right tonsil was clipped when she was twenty-one years old, with good results in the general condition. Only rarely had she suffered from tonsillitis following this operation. She had had malaria during the previous summer, although she did not take to her bed nor use quinine. She had had neuritis in the preceding fall. Her teeth were extracted during the previous October for pyorrhea.

Three weeks before her admission to the hospital on March 14, 1929, the patient became feverish, and was relieved by the administration of quinine. The quinine, however, caused an urticarial eruption. The attack of fever was ascribed by her family physician to malaria. On March 20, 1929, she was seized with an attack of acute tonsillitis, thought to be diphtheria and the specific antitoxin was administered without the amelioration of the condition. During the ensuing week the fever was rather high, reaching 104°, but during the third week it abated somewhat and pains in the knees and diarrhea appeared. The throat continued to be very sore and painful. Slight bronchitis was also present. The continued administration of quinine caused extreme nausea and the patient relied mainly on liquid foods.

On May 6, 1929, the patient looked acutely sick, had lost weight, her skin was warm and dry, and had an icteroid tinge. There was short shallow breathing. She had herpes on the nose and lips, the sclerae were icteroid, the tongue was heavily coated with a white fur, the pharynx was injected and of the lymphatic type. The soft palate was ragged and dirty grey. There was a necrotic lesion on the anterior portion of the left pillar; there was no membrane; there was marked fetor oris. The teeth were extracted. There was no gingivitis. The left posterior tonsillar region presented what appeared to be a peritonsillar abscess. The anterior cervical glands were palpable, tender and discrete, the heart apex was normal and there were no murmurs. Examination of the lungs yielded numerous bronchial rales, but no evidence of consolidation. The abdomen showed generalized tenderness. The liver and spleen were not palpable. There were no palpable glands in the abdomen. The genitalia showed marked irritation and erosion on the left vulva, and a purulent discharge was present. Both knee joints were tender, but without signs of enlargement. The skin was icteroid but there were no petechiae present. The knee jerks were present, and the Babinski was negative. Rectal examination revealed a small rosion. Blood examination showed 3,240,000 red blood cells, 1,200 white blood cells and 65 per cent hemoglobin; the differential count, lymphocytes, 80 per cent; large lymphocytes, 10 per cent; polymorphonuclear leucocytes, 10 per cent, and blood platelets, 296,000. The urine was negative. Smears from the throat were negative for Vincent's, fusiform bacillus and spirilla. Culture was negative for diphtheria.

The diagnosis was agranulocytic angina, or Schultz' disease.

The patient ran a progressively downward course during her stay in the hospital. The fever was continuous, ranging from 97 to 104.4°. The respirations were from 20 to 44, and pulse from 80 to 120. The ulcers on the throat, lips and gums became excavated with no tendency to heal. They did not extend to the neighboring structures, and gave the impression of a fungoid mouth and throat. The tongue became very dry and cracked, and desquamation of the mucous membanes of the mouth occurred.

May 8, 1929, the liver edge was now palpable for the first time; the stomatitis was more marked; sloughing of the necrotic areas took place; there was no tendency to bleed. The ulcers had a greyish red base and ragged edges. There were no fresh ulcers nor membrane in the throat. Apparently the stomatitis was lymphocytic in character. There were tender purpuric areas over the internal surface of the left ankle. There was severe rigor.

May 10, fresh ulcers showed on the lips and gums. There was no membrane present in the throat. The regional lymph nodes were not appreciably enlarged. The liver edge was two fingers below the costal margin. The spleen was not palpable. The knee joints were very tender. Rigors occurred throughout the course of the disease at irregular intervals.

May 15, there were fresh ulcers on the edge of the tongue.

May 16, the spleen was palpable for the first time. The patient had had x-ray therapy according to the method of Friedman over the long bones and the pelvis. She was very nauseated and depressed as a result of the treatment. The mouth condition was the same. She was having diarrhea which was uncontrollable, and becoming more toxic.

May 19, she continued to have five or more stools per day. This continued throughout the remainder of the illness.

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May 23, there was incontinence of stools and urine. She appeared very toxic. A large anal ulcer was discovered.

May 25, ulcerations of the vagina and the rectum were found. They were necrotic, dirty grey, had irregular edges, and irregular greyish bases. They did not bleed. A generalized macular papular rash appeared over the entire body. There was generalized edema. The eyeballs were soft.

May 26, there were muscular twitchings with some rigidity of the neck and soreness in the posterior portion of the neck. She had difficulty in swallowing. There was marked edema of the right foot. Pustules had appeared in the central portion of the papules. Cachectic symptoms were marked. The patient responded with difficulty. There were moist rales throughout the chest.

May 27, there were ecchymotic areas over both legs and ears. She was semi-comatose, her pulse barely perceptible, there were rales throughout the chest, tubular breathing over the right lower lobe of the lung, Kussmall breathing, and she died at 11:37 a. m.

Treatment had consisted of three transfusions of whole blood averaging 200 c. c. each. X-ray therapy was applied over the tonsils and posterior neck on May 10; over the lateral region of the neck, May 11; over the posterior pelvic bones, May 13; and over the anterior surfaces of the lower extremities on May 14. Leucocytic extract was also administered as well as supportive measures as indicated.

Laboratory Examinations.—The urine was repeatedly negative. The Widal was negative, and smears for malarial parasites were negative. Three blood cultures planted aerobically and anaerobically were negative. Cultures from the local lesions in the throat showed *Staphylococcus aureus,* and *Streptococcus viridans.* Smears from the lesions on the left ear showed only an occasional lymphocyte, red blood cell, and gram positive cocci occurring singly, in pairs and in small clusters. The lesion on the chin did not yield any pus, and smears showed no organisms, occasional lymphocytes and no polymorphonuclear cells.

Hematological examinations showed the total white blood counts to range from 1,500 on admission to 500 at death. Blood examinations were done two or three times daily *(see Chart 2).* The white count averaged 1,000 during the major portion of her illness. After May 21, the count averaged 700, but a day before death occurred, it rose to 1,000. The polymorphonuclear leucocytes ranged from 15 to 2 per cent immediately before her death. The average was 10 per cent. The lymphocytes ranged from 85-97 per cent, while the mononuclears were only occasionally noted, and then averaged only 1-2 per cent. Rieder cells were recorded on two occasions. The red blood cell counts and the hemoglobin value were practically within normal limits, and the same is true for the platelets.

The clinical diagnosis was agranulocytic angina.

AUTOPSY

Autopsy was performed one hour after death by Dr. J. Leake.

External examination showed petechiae over the internal surface of the left ankle and a pustular eruption over the entire body. The finger nails of the left hand were markedly discolored. There were necrotic ulcers on the upper lip and frenum. Ulcerations in the vagina and rectum were irregular in outline, shallow, and covered with a dirty whitish membrane. There were present hard, thrombotic and ulcerated hemorrhoids. There were ulcers over the chin and left ear. There were ulcerated areas upon both forearms, the site of needle punctures. The skin showed slight jaundice. The teeth were extracted; the gums were negative. A reddish tinged discharge was found at the vaginal orifice.

The pericardium contained 50 c. c. of a clear straw colored fluid. There was dilatation of the right side of the heart. The aorta presented a few fatty streakings on the posterior wall. There were pleural adhesions at the left apex and at the upper border of the lower lobe. The lower lobe of the left lung was covered by a fibrinous exudate and contained small dark red, non-crepitant and firm areas. On section these areas were 1-3 cm. in diameter, elevated, red and airless.

In the abdomen, the omental fat was pale yellow. There was chronic obliterative appendicitis. The pancreas was harder than normal. There were stones in the gall-bladder. The liver had a delicate glistening capsule. On section, the parenchyma was a reddish brown and contained small tubercle-like areas. The spleen was enlarged, measuring 16x9x3.5 cm., and weighed 300 grams. The capsule was delicate, slightly wrinkled, and beneath it the parenchyma was a greyish pink. The spleen was moderately firm in consistency and everywhere translucent. There was present a firm, circumscribed, bluish red slightly projecting area 1 cm. in diameter. There was also present a pale, very firm nodule, 2 cm. in diameter, and a third somewhat smaller, but otherwise similar to the first. On section, the area mentioned above was light brown in the center and dark brown in the periphery and was dry throughout. The remainder of the spleen on section was a greyish red. The pulp rose above the cut edge and was easily scraped away. Under observation the spleen became softer and friable and quite similar to an acute splenic tumor. The first nodule of the two mentioned, when exposed, was firm, obviously a calcified nodule.

The vagina showed an area which was yellowish green, and opaque and surrounded by a bright red zone.

The bone marrow taken from the lower one-third of the femur was principally fat.

Microscopic Examinations.—Section of the lung showed a mass of bacteria surrounded principally by lymphocytes and some mononuclear wandering cells. Most of the surrounding alveolar spaces were filled with partially fused red blood cells and serum only. Polymorphonuclear leucocytes and fibrin were not seen.

In the spleen, section through the area mentioned, in the gross showed many groups of bacteria surrounded by extensive necrosis with disintegration and degeneration of the cells composing the splenic tissue. There was very little evidence of an inflammatory reaction about these areas. The rest of the section showed some congestion and hyperplasia of the splenic cells.

The bone marrow was aplastic and consisted mostly of fat, with a few small areas of marrow cells, chiefly lymphocytes and other mononuclear cells.

In the liver, small areas of epithelial cells contained several small or one large droplet of fat.

In the vagina, section through the margin of the area described, in the gross showed necrosis with disintegration of the cells and frequent groups of bacteria involving surface squamous epithelium and a part of the corium. Surrounding this area the smaller vessels were

moderately congested and the tissues were moderately infiltrated with lymphoid and mononuclear wandering cells. Polymorphonuclear leucocytes were conspicuously absent.

In the tonsils, *Staphylococcus aureus* (*hemolyticus*); *Streptococcus hemolyticus; B. coli* and *pneumococcus* were seen on smear but were not cultured. The lungs contained B. *pyocyaneus* and *Staphylococcus aureus* (*hemolyticus*). The spleen contained B. *pyocyaneus* (predominating organism); *Staphylococcus aureus*, and *B. coli*.

The anatomical diagnosis was acute gangrenous stomatitis; hypoplasia of the bone marrow; acute bronchopneumonia; acute fibrinous pleurisy; fatty liver; acute splenitis with necrosis; hypoplasia of the bone marrow; acute splenic tumor with areas of gangrene; early arteriosclerosis; and gallstones.

DISCUSSION

Kastlin,[1] in 1927, presented an extensive resume of the first 43 cases of agranulocytic angina. The disease is no longer to be classed among the rare entities, over 150 cases being recorded in the literature. The majority of the reports emanate from Germany, the United States being a close second, then followed by France, while only a few cases have come from England.

An analysis of 43 cases occurring during 1928-1929 is presented with the expectancy of finding reports more extensively recorded, of finding atypical clinical cases and of furnishing a comparison with Kastlin's deductions. It was found, however, that the majority of the reports did not contain sufficient detailed data for a thorough and complete analysis of this disease. The following cases were reviewed: Klein;[2] Potts;[3] Trace;[4] Batten and Carey;[5] Reye;[6] Sharp and Setterstrom;[7] Call, Gray and Hodges;[8] Lasch;[9] Christof;[10] Jacequelin, Celice and Langlois;[11] Bromberg and Murphy;[12] Tschistowitisch;[13] Rose and Houser;[14] Wilson;[15] Schultz;[16] Perrin;[17] Blanton;[18] Campbell;[19] Dasse;[20] Wheelihan;[21] Stillman;[22] Wyatt;[23] Allen;[24] Musser;[25] Blumenthal;[26] Baltzer;[27] Finnigan;[28] Predegrast;[29] Gundruk;[30] Cannon.[31] Our case brings the total to 43.

The sex and age incidence is shown in *Table I*.

With the exclusion of the cases due to known causes, such as arsenical poisoning and typhoid vaccine, the average age for the females was forty-two, and for the males thirty-eight.

Practically one-half of the cases occurred during the third decade in the male, but the greatest incidence in the female was in the fifth decade. This conforms to the usual findings although our average age for the male was slightly higher than that found by other investigators. This can be explained by the occurrence in this small group of one case in the ninth decade.

TABLE I

(a) Sex

Total number of cases	43	
Females	32	(74.4%)
Males	11	(25.6%)

(b) Age variation of all cases, 3 months to 83 years.

Females, average age	32
Males, average age	37

Cases According to Decade

Age Groups	Male	Female
Less than 1 year	1	0
1-10	0	1
11-20	0	6
21-30	5	5
31-40	1	5
41-50	1	9
51-60	1	4
61-70	2	2
71-80	0	0
81-90	1	0

The past histories were negative in 24 cases. *Table II* shows the previous illness of the remaining 19.

TABLE II

History of Previous Illness

Negative past history	24
History of previous illness	19
Previous oral infection	10
Asthma	3
Chronic arthritis	2
Rheumatic pains	1
Operations	5
Syphilis	4
Paratyphoid	1
Influenza	1
Pyogenic infections of skin	2
Gastric ulcer	1
Endocarditis	1
Emphysema	1
Myocardial insufficiency	1
Peritonitis	1
Hypothyroidism	1

The mode of onset was acute in 26 cases. In the remaining 17, it occurred during a period of ill health. It is interesting to note in this latter group the relatively large number of cases giving a history of weakness and malaise of three weeks' to one year duration, usually aggravated immediately before the onset of the acute manifestations of agranulocytic angina. Chronic arthritis is known to produce a leukopenia. Influenza and paratyphoid both cause a leukopenia during the active stages of the disease, which returns to normal limits with convalescence.

TABLE III

Mode of Onset

Acute onset, during period of good health	26
Acute onset, during period of ill health	17
Asthma, 1 to 8 years' duration	3
Chronic arthritis, 1 to 3 years' duration	2
Rheumatic pains, anorexia, headache, 3 months	1
Oral infections with recovery	3
Malaise and weakness, 1-2 months	4
Malaise and backache, 2 years	1
Pyodermia	1
Gastric dyspepsia, and itching of the skin, 5 months' duration	1
Conjunctivitis, difficulty in urinating	1

The onset of the disease was characterized by fever 101-105°, sore throat, chills, malaise and prostration. In our series, jaundice at the onset of the disease was conspicuous by its occurrence in only one case.

The acuteness and severity of the onset of the disease process, even in the group suffering from definite illness, was most striking.

TABLE IV

Symptoms at Onset

Fever	43	Dyspnea	1
Sore throat	22	Anal ulcer	1
Chills	10	Herpes	1
Malaise	7	Vomiting	1
Prostration	4	Anorexia	1
Dysphagia	4	Abdominal pain	1
Bleeding from Mucous membrane	3	Conjunctivitis	1
Gingivitis	2	Edema of ankles	1
Muscle pains	2	Generalized rash	1
Headache	2	Jaundice	1

Adenopathy, suppurative 1

TABLE V

Findings During the Disease

Fever	43	Myocardial involvement	6
Sore Throat	41	Dyspnea	5
Extra Oral Lesions	18	Headache	4
Glandular enlargement	12	Prostration	4
Dysphagia	12	Muscle pains	3
Weakness	10	Diarrhea	3
Chills	10	Enlarged liver	3
Gingivitis	8	Pallor	3
Pneumonia	8	Bronchitis	2
Jaundice	7	Herpes	2
Bleeding mucous membrane	5	Retineal hemorrhages	2
Malaise	5	Hemorrhoids	2
Splenic enlargement	5	Edema of ankles	2
Anal lesions	4	Conjunctivitis	1
Abdominal pain	3	Convulsive seizures	1

Difficulty in urinating 1

There was oral involvement in all but two cases, both of which had anal necrosis and ulceration, and one in addition had necrosis of the fingers. The oral findings were recorded as (1) reddening and swelling; (2) necrosis; (3) membrane formation, and (4) ulceration. The throat was involved in 29 cases, the tonsils in 27, the gums in seven, larynx in five, uvula in four, tongue in three, soft palate in three, epiglottis in two, and hard palate in one. Necrosis involved the following sites: tonsils in 17 cases, the throat eleven, the lips five, larynx one, tongue three, hard palate one, epiglottis one.

A membrane was described as occurring in 25 cases. In 22 it involved the tonsils and in eleven it extended to involve the surrounding structures. It was usually described as dirty grey, but less frequently as yellowish white, greyish black or greyish yellow. In all cases, it was described as easily removable, leaving an ulcerated bleeding surface. The ulcers were surrounded by a red or hemorrhagic areola. In two cases, gingivitis was the first complaint. In one it followed the extraction of a tooth. In the other, swelling of the gums with a visit to a dentist was the first finding.

Ulceration of the lips was noted twice. Necrosis was noted three times: (a) of the left index finger and right small finger; (b) of the mammary gland; (c) in the upper left quadrant of the abdomen. Pustules and abscess formation were recorded three times; erythematous rash and blotches, twice; ecchymosis once; papular rash twice; petechiae four times, involving the clavicles once, the abdomen and extremities once, shoulders and legs once, and shins twice. Edema of the ankles was found twice; necrosis of the labium majus was noted three times; swelling of the left arm without any accompanying inflammatory signs was found in one case.

The regional lymph nodes were enlarged in eleven cases. In only one was there generalized nodular involvement. The glands were enlarged, tender, did not fluctuate nor suppurate in nine cases. In the remaining three cases, fluctuation with drainage eventually took place, and the majority of the latter group recovered. This finding merely signifies a return of the granulocytes to the circulation with subsequent pus formation at the local site of inflammation.

Anal lesions occurred in four cases. They were characterized by extreme pain and ulceration.

Pneumonia was noted in eight cases. It usually involved the lower lobes, was of the massive bronchopneumonia type, came on late in the disease, with a thick, ropy and at times hemorrhagic sputum. From autopsy findings, pneumonia

occurs in practically all cases. Bleeding from the mucous membranes was noted five times, epistaxis three times, bleeding from the gums once and in the remaining case, hemorrhage from the gastro-intestinal tract. Retinal hemorrhage occurred twice, in one case leading to total blindness. Jaundice occurred seven times, but in only two was it marked. Myocardial insufficiency was found six times, usually a terminal finding. In two of the patients, signs of heart failure had occurred previous to the onset of the agranulocytic angina.

Cultures from the oral and extra-oral lesions were made in thirty cases. In some of these, the examination consisted only of ruling out Vincent's and diphtheria. As the compilation of cultural findings in *Table VI* shows, there was no single organism which was found in every case or frequently enough to be incriminated as the etiological agent of this disease.

TABLE VI

Bacteria isolated from the oral and extra-oral lesions:	
Staphylococcus	9
Streptococcus hemolyticus	8
Streptococcus viridans	1
Streptococcus non-hemolyticus	1
Vincent's	10
Pneumococcus	3
Pyocyaneus	2
Micrococcus	1
Diphtheroid bacillus	1
Gram negative coccus	1
Gram negative bacillus	1

Table VII shows the blood cultural findings.

The majority of the cultures were negative. This tends to show that the disease is not due to a septicemic process. *B. pyocyaneus,* which has been found to possess a leucocytotoxic action, was found only twice, and then only at autopsy, as a terminal invader. This observation fails to substantiate the importance ascribed to this organism in the causation of agranulocytic angina.

Blood cultures were done in 24 cases:
19 were negative during life.
1 was negative during life and positive at autopsy.
Positive blood culture findings:
Pneumococcus type 1 once.
Pneumococcus type 3 once.
Pneumococcus type 2, during life and *B. coli* and *B. pyocyaneus* at autopsy.
Streptococcus viridans
B. pyocyaneus at autopsy.

The blood counts showed that the red blood cells and the hemoglobin were but slightly affected in the disease process, a moderate secondary anemia being the usual finding. A severe secondary anemia was occasionally found in patients suffering from a chronic ailment or having marked bleeding.

TABLE VIII

Red Blood Cell Counts and Hemoglobin Percentage.			
R. B. C.	No. Cases	Hemoglobin	No. Cases
100,000-2,000,000	7	11-20%	1
100,000-3,000,000	2	21-30%	2
100,000-4,000,000	9	31-40%	0
100,000-5,000,000	5	41-50%	7
100,000-6,000,000	3	51-60%	1
		61-70%	3
	Total 26 cases	71-80%	6
		81-90%	1
		91-100%	2
		Total Cases	23

The initial white blood cell counts varied from 3,500 to 220. The initial count usually was 1,000-1,400 which rapidly fell to four or five hundred. The lowest count recorded was 175. In one case the initial fall took place, but a rise of 6,400 before death was recorded. The cases due to arsenical poisoning and typhoid vaccination usually showed a much higher total white blood cell count throughout the course of the disease, but in the fatal case of arsenical poisoning there was present the relatively low initial count of 1,600 which fell to 400 before death. The polymorphonuclear leucocytes ranged from 0-25 per cent and averaged 4 per cent during the height of the disease. It is noteworthy that in the cases that recovered, the percentage of the polymorphonuclears returned to normal very rapidly, usually on the tenth to the fifteenth day of the disease, while the total white blood cell counts were much slower in arriving at their normal levels, requiring fifteen to twenty days. On recovery, a leucocytosis was present. In one case a count of 28,000 was recorded. The lymphocytes ranged from 16-100 per cent, the mononuclears from 0-68 per cent, the latter figure being recorded in a case of arsenical poisoning. The mononuclears were increased relatively and absolutely in all cases following arsenical poisoning and typhoid vaccination. This would serve to differentiate this group of cases of known etiology from those whose cause is still to be unraveled. Young polymorphonuclears were found in blood smears in four cases, averaging from 0.4-1.6 per cent. Two of these cases recovered.

Blood examinations previous to the acute onset of agranulocytic angina were made in eight cases. In only three were the white blood cell

TABLE IX

White Blood Cell Counts

Case	Day of Disease	Total W.B.C.	PMN. %	PMN. Total	Lymps. %	Lymps. Total	Monos. %	Monos. Total	Early Polys. %	Early Polys. Total
1	6	1,100								
	6	400								
	7	175	0		90	158	10	17		
2	3	1,350				1350				
3	2	2,200			89	1815				
	5	800								
6	5	2,000								
7	17	1,200	4	48						
8	5	2,100	1	21	[illegible]	1323	6	126		
	9	500								
9	19	220	9	20	80	176	4	9		
10	2	3,500	2	70	96	3150	2	70		
	3	1,200								
	4	3,800			(Fatal case with a rise in the count.)					
	5	6,400								
11	5	1,400	15	210	72	1008	8	112		14
	7	740	11.5	85	69	513	4.5	33		
	9	750	26	195	47	342	6	45	6	117
	11	1,150	39.5	454	39.5	452	6	69		138
	13	2,825	39	1101						
	14	2,980	49	1450	(Recovery with the use of x-ray)					
	15	3,225	53	1709						
	16	3,224	64	2066						
	18	5,800	73	4239						
12	3	900	5	45	[illegible]	810				
	4	800			100	800				
13	6		1		76		22			
					(Recovery in a child 3 months, with suppurative glands.)					
	12		38		30		8			
	15	28.000	58	16,200	29	8120	10	2800	1	280
14	22	1,600	15	240	75	1200	8	128		
	26	400	10	40	89	356	(Fatal case of arsenical poisoning.)			
15	4	5,400								
	9	7,000	3	210	45	3150	50	3500	(Typhoid vac-	
	11	4,500	.3	13	47	2133	51	2295	cination with	
	13	5,600			55.4	3102	44.6	2497	death.)	
16	16	1,900	4	76					.6	11
18	20	2,000	26	560	60	1200				
19	6	600			100	600				
20	13	7,950	0		37	2931	62	4929	(Case of ar-	
	8	4,760	16	761	61	1051	39	1852	senical poi-	
	11	5,040	51	2570	34	1738	12	604.8	soning with	
	15	7,840	60	4704	29	2304	8	646	recovery.	
21	3	1,000	1	10	89	890	10	100		
22	2	1,200	3.3	43	16.35	196	78	938	1.5	15
23	7	1,000	4	40	96	960				
	8	1,200	50	600	34	408	13	156	(Typical case	
	10	3,400	50	1700	30	1020	13	442	with recovery.)	
	12	6,200	77	1894	19	1178	4	248		
24	6	900								
	8	600								
	10	1,500								
	14	1,000	7	70	92	920	1	10		
25	6	6,200	10	620	90	5580				
26	2	1,800	12	216	84	1512	4	72		
	4	300	3	9	93	279	4	12		
	14	7,800	62	4836	35	2730	3	234		
27	5	1,000	21	210	76	760				
28	16	900	6	45						
	17	500	3	15						
29	3	1,800	2	36	30	540	68	1224		
	7	700	5	35	95	665				
	11	1,400	25	350						
	15	2,800	61	1708						
30	18	1,200	6	72	94	1128				
	19	1,400	4	56	96	1344				
31	2	1,000	1.2	12	94	940	4	40		
32	No blood work.									
33	21	3,500	12	420	37	1295	51	1785		
34	28	1,059			58	614	42	494		
35	3	400	2	8	96	386	4	16		
36	6	3,000	22	660		2310				

TABLE IX—(Continued)

Case	Day of Disease	Total W.B.C.	PMN. %	PMN. Total	Lymps. %	Lymps. Total	Monos. %	Monos. Total	Early Polys. %	Early Polys. Total
38	6	950	13	123	64	618	11	104	11	104
	8	1,600								
	11	2,000	22	440	(Typical case with recovery.)					
	12	4,200	57	2394						
	17	8,500	66	5610						
	22	10,000	85	8500	14.5	1450				
39	6	10,000			90	900	10	100		
40	3	660	16	105	82	541				
		340			98	332			8	27
41	2	400	0	0						
44	See chart of daily blood counts									
4, 5, 17, 32, 37, 42—no blood work.										

TABLE X

Previous Blood Examinations.
Blood Counts Done Before the Attack of Agranulocytic Angina.

Case	Date Before P-1	R.B.C.	Hb.	W.B.C.	PMN. %	PMN. Total	Lymphs. %	Lymphs. Total	Monos. %	Monos. Total
1	1 year	4,730,000	92%	3,900						
2	1 year			600	60%	360	Attack of fever with cervical adenitis.			
3	3 days	3,370,000	45%	2,800	7%	196	80%	2,240	4%	112
4	6 weeks	5,590,000	90%	5,600	69%	3,854	26%	1,456		
5	3 months	4,900,000	80%	1,800	11%	198	83%	1,494	2%	36
6	9 months	Normal counts and differentials.								
7	9 months	4,700,000		7,000 and normal differential						
8	7 weeks	1,300,000	20%	1,000	21%	210	76%	760		

counts normal. The importance of this finding will be discussed later.

The duration of the disease and the mortality rate are given in *Tables XI and XII,* respectively. Two cases following arsenical poisoning recovered in five and seven days, respectively, while the true cases of agranulocytic angina required nine, ten, eleven and seventeen days, respectively.

TABLE XI

Duration of the Disease

1st Week

2 days.....1
3 days.....2
4 days.....1
5 days.....3
6 days.....4
7 days.....2
13 or 36.5%

3rd Week

15 days.....1
18 days.....2
19 days.....2
21 days.....2
9 or 25%

2nd Week

8 days.....2
9 days.....1
10 days.....1
12 days.....1
14 days.....2
7 or 19.4%

4-6 Weeks

22 days.....1
23 days.....1
26 days.....2
28 days.....2
42 days.....1
7 or 19%

TABLE XII

Mortality

43 cases, 7 recoveries, mortality rate of 83.8%.
3 cases due to arsenical poisoning.
40 cases with 5 recoveries, mortality rate of 87.5%.
4 females and 3 males recovered.

Recoveries according to age groups.
1-10, 2 cases (one arsenical poisoning).
11-20, 0
21-30, 2
31-40, 0
41-50, 1
51-60, 1
61-70, 1
71-80, 0

Autopsies were performed in 19 cases. The microscopic findings of the oral lesions may be summarized as follows: There is present an outer structureless layer of necrotic tissue with ulceration, containing numerous colonies of bacteria. This is surrounded by an inner edematous zone of tissue showing varying degrees of nuclear degeneration, permeated by fibrin and at times containing plasma cells and lymphocytes. The vessel walls show necrotic changes and their lumina are filled with hyaline and fibrin thrombi. Absence of polymorphonuclear leucocytes in the oral lesions occurred in all cases of our series. The lung findings are (1) massive extravasation of partially fused red blood cells into the alveoli; (2) filling of the alveoli with a fibrin network; (3) filling of the alveoli with a hyaline material; (4) small patches of necrosis; (5) occasionally necrosis of the vessel walls with hyaline and fibrin thrombi. Usually two or more of these changes were found in the same section. The

necrosis of the lung tissue was not so extensive as that found in the oral lesions. The liver showed (1) cloudy swelling; (2) fatty degeneration of the central portion of the lobule; (3) chronic passive congestion; (4) jaundice; (5) cytolysis and vacuolization of the liver cells; (6) isolated areas of necrosis; (7) periportal lymphocytic infiltration; (8) absence of polymorphonuclears. The spleen was (1) practically always enlarged at autopsy; (2) the sinusoids were usually filled with blood; (3) the polymorphonuclears were absent in the great majority of the cases, but plasma and young lymphocytes were present in varying degrees; (4) necrosis of the vessel walls occasionally was present; (5) polymorphonuclear eosinophiles at times were present; (6) endothelial cell hyperplasia occasionally occurred.

The bone marrow was examined in twelve cases, in nine of which it was red and in three yellow. In only two cases were polymorphonuclear neutrophiles present. Rose and Housser[14] findings are of interest, namely, an erythroblastic regeneration and a myeloid degeneration of the bone marrow elements of the femur. The myeloid degeneration was manifested because the outline of the myeloid cells was indistinct and ragged, their cytoplasm taking an eosin stain, or containing hyaline droplets, and their nuclei being ballooned and pyknotic. Entire cells were transformed into hyaline masses. The polymorphonuclear basophiles and eosinophiles occasionally were met with in the bone marrow. Hemorrhagic swelling of the tracheobronchial lymph nodes was found in one case.

DISCUSSION

Agranulocytic angina is characterized by a relative and absolute decrease of the agranulocytes of the blood and blood forming organs associated with necrosis and inflammation in other organs. This decrease of the agranulocytes may be due to (1) lack of cell formation; (2) increased destruction; (3) abnormal distribution. Ross and Housser[14] summarize the various hypotheses relative to the etiology. It may be (1) a specific disease entity; (2) a primary disease of the granuloleucopoietic apparatus and secondary foci; (3) the progenitors of the granular cells are injured by a specific noxa, the organism thus being rendered defenseless against secondary invading organisms which produce the visceral and the oral lesions; (4) the condition is the result of the infection superimposed upon a pre-existing hypoplasia of the granulocytic apparatus; (5) it is a form of malignant leukopenia to be grouped with the septic or the leukemic conditions showing reduced percentage of the polymorphonuclears; (6) the ulcerative lesions are produced by bacterial emboli following a primary attack upon the granulocytic centers, leaving only the reticulo-endothelial elements to offer resistance; (7) the condition is a type of reaction to an overwhelming infection septicemia, in a subject with low resistance, or a terminal reaction in other conditions. We believe that the oral and visceral lesions are secondary to the leukopenia and result from the lowering of the local and general resistance brought about by the diminution of the granular cells. This is brought out in our series where blood examination had been done previous to the onset of the agranulocytic angina. In seven such cases, excluding the case of arsenical poisoning, five showed definite leukopenia with a diminution of the percentage of the polymorphonuclear leucocytes *(see Table 10)*. In Kastlin's series, however, three cases on admission to the hospital showed normal white blood cell counts and differentials and later developed agranulocytic angina, but leukopenia changes in the blood were noted prior to the development of the local changes. These findings, while differing from our leukopenic changes in the above five cases, still show that the leukopenia precedes the local inflammatory and necrotic changes. The location of the lesions in sites which harbor organisms continuously, such as the throat, rectum, anus, and vagina, would explain the ready occurrence of such lesions concurrent with the diminution of local and general resistance. These lesions thus arise secondary to the blood changes.

We do not believe that agranulocytic angina is a disease entity for the following reasons: (1) leukopenia can occur in starvation, chronic intoxications, particularly those due to lead, arsenic, thorium, benzine, mercury, alcohol, ether or morphia, irritation with x-rays, diseases of the blood forming organs such as pernicious anemia, aplastic anemia and aleukemic leukemia, Banti's disease, dengue fever, kala azar, measles, influenza, malaria, glanders, typhoid, fulminating sepsis, and lobar pneumonia (fatal cases); (2) epidemicity of the condition has not been reported; (3) there is no constant etiologic agent; (4) satisfactory experimental reproduction of the condition with material from the affected patients has not been accomplished. The occurrence of necrotic angina, as described by Lenhartz,[34] attended by a leucocytosis and a relative

and absolute increase of the lymphocytes and a relative decrease but an absolute increase of the polymorphonuclear leucocytes, causes speculations as to its relationship to agranulocytic angina and the relationship of these two conditions to acute lymphatic leukemia. The theory is advanced, though without any substantial evidence since the etiological agents of the three diseases are unknown, that these agents produce the three conditions. In its mild form, we have lymphocytic angina. In cases of moderate severity, acute lymphatic leukemia, and in the peracute forms, agranulocytic angina. The occurrence of generalized nodular enlargement[10] with a blood picture of agranulocytosis and the occurrence[13] of fever, enlarged cervical lymph nodes, and leukopenia one year prior to the onset of agranulocytic angina, soon followed by a normal white blood cell count with a lymphocyte percentage of 60 and then by a leucocytosis with a lymphocyte percentage of 70, speaks for this relationship between the three conditions. The decrease in the granulocytes is caused by the direct action of the unknown deleterious agent on the myeloid tissue, according to the observations of Rose and Houser.[14] Once this agent ceases its activity, the recovery is rapid. Recovery is manifested by the healing of the local lesion, by the return of the granulocytes to their normal percentage and by a more gradual return of the white blood cell counts to normal.

SUMMARY

(1) A case of agranulocytic angina is presented.

(2) Characteristic clinical findings are fever, sore throat, chills, malaise, which progress to severe toxemia, jaundice and death, usually due to a bronchopneumonia or myocardial failure. The throat lesions rarely may be absent. The onset occurs in a period of good health in one-half of the cases. There may be regional adenopathy. Enlargement of the liver and the spleen occur late during the course of the disease. Petechiae are rare.

(3) All methods advocated as therapeutic agents, such as x-ray, frequent blood transfusions and leucocytic extracts, failed to bring about a cure in this case.

(4) The blood changes consist of absolute and relative neutrophilic and absolute lymphocytic decrease.

(5) Agranulocytic angina, following arsenical poisoning and typhoid vaccination, shows a relative and absolute monocytosis.

(6) Recovery is manifested by healing of the local lesions with return of the percentage of the granulocytes to their normal levels, and by a more gradual rise of the total white blood cell count.

(7) The theory is advanced that lymphocytic angina, acute lymphatic leukemia and agranulocytic angina are clinical responses to the same etiological agent manifesting different degrees of virulence.

(8) In a certain percentage of cases of agranulocytic angina, the blood shows the abnormality of a leukopenia and reduction of the granulocytes before the onset of the angina.*

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DISCUSSION

Dr. Alfred Blumberg, Oteen, N. C.—Conditions of the kind described by Dr. Rudner probably existed before Schultz first gave us his resume. As Dr. Rudner pointed out, case records of various observers deviate considerably in the description of the clinical characteristics and etiology of so-called agranulocytosis. The only feature described, which remained classical, was the absence of the granulocytes. Their absence is noted, however, in other conditions as well. The discussion of aplastic anemia by Frank pointed out a deficiency of granulocytes years before Schultz's observation. It is difficult to correlate the findings of the various case reports. The bacteriological and post mortem findings differ as much as the clinical manifestations. The blood findings also differ, since some of the cases showed no anemia whatsoever, while others showed a grave anemia; some of the cases had platelets in normal numbers, while others had no platelets. In some cases there was an absence of nucleated red corpuscles, in others they were present. In the post mortem findings there was but one constant characteristic, and that was the absence of myelocytes and myeloblasts. Otherwise the findings were divergent.

I have finally come to the conclusion that the condition may be grouped in at least four different types: one in which there is a definite etiological factor, some bacterial organism causing a focal infection, after the removal of which the patient recovers. In the next type, the etiology is indefinite but recovery may follow with or without treatment. Cases belonging to this type, however, very often recur and upon recurrence they terminate fatally. To the third type belong those cases in which the onset is sudden without any known etiological factor and termination is fatal after a short period of illness. The fourth type is characterized by the sudden onset, but the condition apparently becomes chronic and is followed by grave anemia.

An intensive invasion of *B. coli* had taken place in the patient observed by me some time ago. The tissue demonstrated to you by means of lantern slides, showed the tremendous numbers of these organisms in the kidneys, lungs, pancreas, the bacterial embolus in the heart and the emphysema in the lung. The section of a rib shows a great deal of blood pigment and the absence of myelocytes, myeloblasts and polymorphonuclear leucocytes. The blood cultures before the patient's death exhibited the same organisms. I feel certain, however, that the colon bacillus found in this patient does not represent the etiological factor, its presence being merely a terminal event.

Dr. F. C. Hodges, Huntington, W. Va.—We have been doing hematological examinations a long time, and yet this condition remained undescribed until 1922, when Schultz brought it to our attention. I am sure that it existed before this time, but am also sure that it is more frequent now than formerly. Probably it has been termed streptococcic sore throat.

Most of these patients have a sore throat with a membrane or necrotic area resembling Vincent's disease, diphtheria, or syphilis. Clinically it is often difficult to tell one of these conditions from the other, but should we see such a throat, with a culture negative for diphtheria, negative for Vincent's, and a negative blood Wassermann, we should by all means do a blood examination, consisting essentially of a total leucocyte and differential count. The blood diseases with which this may be confused may be ruled out by one or more such counts. We shall find that the average of two or three counts will show the granulocytes to be not more than 7 per cent, and the total leucocytes to be not more than 2,000 or at most 3,000. If one examination be not conclusive, it should be repeated two or not more than three times for the true condition to become manifest.

The German observers seem to prefer the term agranulocytosis instead of agranulocytic angina. The former seems to me to be preferable, as cases have been described without angina.

The treatment of this disease was, I think, very unsatisfactory until Friedmann reported seven successive cures by roentgen therapy. He employed mild stimulating doses over the long bones at 24 hour intervals, 1/20 H. E. D. deep therapy, filtered through 0.6 mm. copper. All other methods have proven futile so far as we can determine. I think any method which can show seven successive cures, whereas others have had 90 per cent failures, deserves our consideration. When we make the diagnosis, this method should be employed.

We have had three cases, all of which proved fatal. The first two occurred before the publication of the roentgen treatment, and the third was seen only when moribund.

One of the most characteristic features of agranulocytosis is the microscopic appearance of a section taken through the ulcerated or necrotic area in the throat. Taken from without inward, or from the superficial to the deep portions, we shall see first a layer of coagulation necrosis with no cell formation, with the loss of all nuclei, and with a few or many bacteria of various kinds embedded. Next, we find tissue containing only a few isolated round cells, with no attempt at forming an inflammatory reaction, and an entire absence of polymorphonuclear infiltration. Deeper yet, we find the normal muscles and mucous glands, with an entire absence of inflammatory exudate. Pneumonia is a frequent complication, and sections through the pneumonic areas also show a lack of the usual inflammatory exudate and reaction.

I agree with Dr. Blumberg that a blood stream infection is only a terminal event, that septicemia is not the etiologic factor. The consensus of opinion of most observers seems to be that a toxin is liberated which paralyzes the centers of granulocyte formation;

and in some cases the development of megakaryocytes, from which the platelets are derived, is also much interfered with. The toxic agent seems also to have a destructive action on the granulocytes which are circulating in the blood stream.

Dr. Rudner (closing).—Dr. Musser's writings on the lymphatic reactions of diseases stimulated me in this work. Most of us who were students sixteen or eighteen years ago remember the term "septicemia with leukopenia." Osler described this as a definite condition, from which the patients died. I believe it is the condition which we now call agranulocytic angina.

I purposely omitted all my pathological findings because they were too lengthy to read. The only thing in the pathology from a clinical standpoint that was striking to me was that in the throats there was an absolute absence of tissue reaction, and inflammation. There was not enough granulocytosis to produce reaction. There is an attempt at resistance, but not an inflammatory reaction. Another point is that these ulcers do not bleed easily. They are different from Vincent's ulcer, although we find the organism in many of the cases.

As soon as I recognized the case described here, I tried the newer methods of treatment, with x-ray and transfusions, and in spite of everything the woman died of bronchial pneumonia.

SPRUE TREATED WITH LIVER*

By FRED WILKERSON, M.D.,
Montgomery, Ala.

The case that forms the subject of this report was a white man, forty-nine years of age, native of Alabama, a traveling salesman. He was first seen on May 18, 1929.

His chief complaint was of attacks of painless diarrhea during the preceding twenty-nine years.

The family history was negative as far as the present illness was concerned.

He had had the usual diseases of childhood. He had had malaria in the Philippines in 1899, while he was a soldier in the U. S. Army. A painless diarrhea developed in the Philippines in 1900. He had influenza in 1926 and in January, 1929, both attacks mild. He had had no operations except a colostomy in 1916. There was no history of venereal disease.

He used tobacco moderately, but had not used alcohol for many years. He drank three cups of coffee a day. His appetite was good and he ate vegetables and meats more than carbohydrates.

About 1900, while he was in the Philippines, he developed a painless diarrhea, which had persisted more or less irregularly ever since. At times there would be severe attacks, then some improvement, but his stools were loose a great part of the time even when he was not severely ill. In 1916 his condition became such that he came to Montgomery for treatment. His stool was examined and he was told that he had amebic dysentery. He was treated with emetin without relief and finally a colostomy was done. He was irrigated through the colostomy wound with quinine and other drugs for about eighteen months and he gradually improved so that he was finally able to resume work. He had never been well, however, but had always had loose movements and at times severe attacks of diarrhea. He had been emaciated and weak and had been growing steadily worse during the five months prior to the time of my examination. He had three to five large, loose movements, usually in the morning. They were foamy, cream colored and sour smelling. There had never been tenesmus, blood or mucus. He had had for the entire twenty-nine years a great deal of gas and had been conscious of discomfort in his abdomen all of that time. At times he had had soreness on the tips and sides of his tongue and occasionally some burning and tingling of his fingers and toes. There had been no other symptoms worthy of note except emaciation and weakness.

PHYSICAL EXAMINATION

He is a very thin, emaciated, weak-looking man, 68½ inches tall, weighing 115½ pounds. His skin and mucous membranes have a pallor suggestive of pernicious anemia. The sclerae are subicteric, the temporal arteries are tortuous and thickened. The pupils are equal and react to light and accommodate. There is no exophthalmos. There is no lid lag. The eye movements are normal.

The external ears and nose are normal.

The teeth and gums are in only fair condition, there being considerable pyorrhea.

Tonsils are small.

The tongue protrudes in the mid line without tremor and is red and smooth around the tip and sides.

There is no thyroid or glandular enlargement. There are no abnormal pulsations.

The chest is of the long, narrow type and is symmetrical. The expansion is normal and equal.

The lungs show no abnormal physical signs.

The heart is normal in size and position. The sounds are clear and distinct. The aortic and pulmonic seconds are equal. There are no murmurs. The action is regular.

The pulse is 92, regular, strong, with good volume, and no thickening.

The blood pressure is 90/60.

There is a scar of an old operation in the appendix region of the abdomen. The abdomen is prominent below the umbilicus. The muscles are flabby and the abdominal wall is thin. The abdomen is soft. There are no masses. There is no rigidity or tenderness. The liver, spleen and kidneys cannot be felt. The liver dullness is normal. There are a few pea-sized glands in each inguinal region.

The extremities are normal.

The knee jerks are active and other reflexes are normal. There are no objective signs of a cord lesion.

Digital examination reveals no abnormality of the prostate or rectal ampulla. The proctoscope reveals no ulcerations of the mucous membrane.

LABORATORY FINDINGS

The Wassermann is negative. The red blood count is 2,240,000; white blood count, 8,200; polymorphonuclears, 73; small lymphocytes, 26; large lymphocytes, 0.5; transitionals, 0.5, and hemoglobin 55 per cent. The blood smear is negative for malaria. There is an apparent macrocytosis; no poikilocytes; a suggestive early

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anisocytosis, and there are no nucleated reds. The color index is above one.

Several specimens of feces were examined. They were diarrheal and large, of uniform consistency. They were sour-smelling and cream colored. There was no gross mucus. There were no pus cells, but some red cells. There were no amebae. There were no yeast cells. Microscopically there were many fat droplets demonstrable in all fields. *Monilia psilosis* were not discovered.

The gastric contents revealed an absence of free hydrochloric acid. The total acids were 12.

The urine was amber in color, acid, contained small amount of albumin, and no sugar. Microscopically there were numerous hyaline and granular casts, but no pus or red cells. The test for bile pigments was positive. The test for urobilinogen gave only a suggestive delayed weakly positive reaction.

X-ray of the gastro-intestinal tract did not reveal organic disease.

A diagnosis of tropical sprue was made and he was put on a diet low in carbohydrates and fat, high in protein, fresh vegetables and fruits. He was given pancreatin gr. 10 before meals, and dilute hydrochloric acid, one teaspoonful, after meals. Because of the similarity of the laboratory findings to those of pernicious anemia he was put on liver, one-half pound a day, when it was available, and four tubes of liver extract (Lilly No. 343) on days when he could not get the whole liver. He lived in a rural district and was able to get the whole liver only two or three days a week.

During the first week of treatment he lost two pounds in weight and felt weak, but after three days he began to have only one movement a day and to feel more comfortable in his abdomen. At the end of the first month he felt much stronger, his bowels were entirely normal, his red count was 3,600,000 and his hemoglobin 63 per cent. At this time the pancreatin was discontinued and he was allowed a normal mixed diet. The dilute hydrochloric acid and the liver were kept up, as it was my opinion that the liver, more than the diet, was the main factor in his improvement. On August 28, 1929, the last time he was seen, his red count was 5,000,000, his hemoglobin was 76 per cent, and the smear was entirely normal.

He stated that he felt better than he had at any time during the past twenty-nine years and his appearance was that of a man in good health. He was advised to continue the acid and the liver in reduced amount. He has not been seen since, but on December 24, 1929, he reported that he was in splendid condition, having normal stools and weighing 147 pounds.

In spite of the fact that we were unable to find *Monilia psilosis* in this case I think we are justified in making a diagnosis of sprue. The disease developed in an area where sprue is endemic and has persisted with remissions for twenty-nine years, a rather long time for sprue it is true, but much longer than any case of pernicious anemia I have ever seen. The character of the stools, the emaciation, are both typical of sprue rather than of pernicious anemia, in which the subcutaneous fat is usually well preserved. In my observation a pernicious anemia patient with a red count of over 2,000,000 and a hemoglobin of 50 or more is not nearly so weak as this man was. There were no evidences of spinal cord involvement except the slight tingling, whereas in a case of real pernicious anemia of this duration it is extremely likely that cord symptoms would have been marked. The blood picture, the tongue symptoms and the achylia, of course, would go with either condition. It is possible that we should have been able to isolate the monilia had this patient been under close observation in the hospital, but he lived in a rural community some distance from Montgomery and was seen at rather infrequent intervals. It was impossible to hospitalize him, so the study of the case is not so complete as it would have been had he been under closer control. I realize fully that oftentimes a definite line of demarcation cannot be drawn between the two diseases and that a case of apparent pernicious anemia may several years later be found to be one of sprue or vice versa, but for the reasons given above I feel that this was sprue. It was certainly different in its clinical manifestations from any case of pernicious anemia I have seen.

Serra[1] comments on the rarity of achlorhydria in sprue as compared with pernicious anemia and states that in sprue as improvement occurs and the blood returns to normal, free acid again appears in the stomach in most instances, which, of course, is not true in typical pernicious anemia. He also states that the blood picture in sprue is more aplastic in type than that of pernicious anemia. This author regards the two diseases as entirely distinct entities.

Cowen,[2] of Australia, in 1926, reported a case in which the diagnostic difficulties were similar to the one just discussed and states that the geographical distribution of the two diseases is one of the most important points of distinction, and that sprue is acquired only in tropical or subtropical countries. We know now that this is not correct, for many undoubted cases endemic in this country are on record. Cowen with Castellani and many other observers feels that the *Monilia psilosis* is not proven to be the cause of the disease, while Ashford[3] in a recent article states that:

"Sprue is believed to be due, fundamentally, to a nutritional unbalance on which is superimposed *Monilia*

psilosis to develop the picture that is recognized the world over, as a clinical fact."

In a study of several hundred cases he finds the monilia in 55.3 per cent of cases of sprue and 5.6 per cent of the healthy controls.

Manson-Bahr[4] and associates in a study of the two diseases state that in pernicious anemia the onset is notoriously insidious, while in sprue it is frequently sudden, as it was in my case; that diarrhea was present in all their cases of sprue, but not in all their pernicious anemia cases, and that in none of their cases of pernicious anemia when diarrhea did occur was it similar to the diarrhea of sprue. The sore mouth and tongue are so prevalent in both diseases that they cannot be used in the differential diagnosis. These authors regard the abdomen in sprue as of value in the diagnosis as the "wall is invariably thin, and often distended, with especial prominence in the subumbilical area." With other authorities they feel that central nervous system involvement is much less in sprue, that there may or may not be achlorhydria, that the loss of weight in sprue is much greater than is usually the case in Addisonian anemia, and that the blood picture may be and, in the grave case, is usually very similar to that of the latter disease. They, too, regard these diseases as distinct entities, admitting, however, that they have many features in common. They regard the sprue anemia as secondary to the gastro-intestinal lesions and the anemia in Addison's disease as due to disease of the blood-forming organs.

Wood[5] in a very interesting work which, so far as I am aware, has not been confirmed, recovered the *Monilia psilosis* from the feces, gastric contents and gums of pernicious anemia patients who had pyorrhea. He also fed guinea pigs with the monilia and produced a hemolytic anemia, and found that a filtrate of the *Monilia psilosis* in dextrose water injected intravenously into rabbits caused blood changes apparently hemolytic in nature. He is convinced that the two diseases are closely related. There have been many articles dealing with this relationship, including a report by Musser,[6] who says that "we cannot afford to scoff at the idea that the two diseases have the same genesis."

The discovery of the effectiveness of liver in pernicious anemia, which was not known at the time several of the articles quoted above were written, has recently increased interest in this possible relationship and may be the means of proving or disproving the truth of the theory. Liver has been employed with success in a number of cases of sprue since the discovery of its value in pernicious anemia. Ashford[7] states that a marked increase in the reticulocytes occurred and lasted for at least two months after the administration of the liver extract. Bloomfield and Wyckoff[8] report three cases of sprue in which satisfactory remissions were obtained with liver extract.

The case here reported certainly offers additional evidence of the remarkable value of liver in this disease and confirms the results of the other observers. The two diseases, in addition to having many points of similarity in their clinical course, now appear to yield to the same therapeutic agent, this being another link in the chain of similarity. If, as Manson-Bahr suggests, the anemia of sprue is the result of inability of the patient to eat because of the gastro-intestinal changes, while that of pernicious anemia is due to disease of the blood-forming organs, it would not seem that liver would be effective in both. Of course, there is still much uncertainty as to the etiology of each disease and it is not yet known how the liver acts in either, but it would seem that a similar toxin must be acting on the blood-forming organs in each instance or a similar deficiency may be present, and that the liver exerts its favorable influence in the same manner in each disease. The recent work of Castle and Townsend[9] on pernicious anemia in which they suggest that an inadequate gastric digestion of protein may permit the development of a deficiency is highly suggestive and may lead to a more thorough understanding of each disease and to a knowledge of the rationale of liver therapy in each instance.

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TROPICAL SPRUE: REPORT OF A CASE*

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Sprue, synonyms psilosis, Cochin-China diarrhea, diarrhea alba (white flux), Ceylon sore mouth, aphthoides chronica, "bowel consumption," and so forth, is a disease or condition occurring in the tropics, sub-tropics and sporadically throughout the larger part of the world. It is characterized by a sore mouth and tongue, a distinctive type of diarrhea, and an anemia which is usually regarded as secondary but which frequently manifests a color index above 1. It is also characterized by its marked chronicity and striking remissions and exacerbations often at prolonged intervals.

It occurs endemically in Mayala, Sumatra, Java, Siam, India, Ceylon, Fiji Islands, tropical Africa, West Indies, and in the Southern portion of the United States, especially in the Carolinas, Virginia, Georgia, and Mississippi.

In reviewing the literature it is found that even before the classical account by Hillary[1] in 1766, a Dublin physician by the name of John Brickell described sprue under the term "white flux." Hillary's description, which was made in the Barbadoes, is full and accurate. He called it "aphthoides chronica." In 1880, Sir Patrick Manson[2] gave the first full account and coined the word sprue. In 1897, Thin's[3] important monograph appeared under the title "psilosis." In 1908, Carnegie Brown[4] contributed an important monograph, as did Begg[5] in 1912, where the use of yellow santonin in treatment was strongly urged. Since 1905 several cases have been reported in the South. Graham, of Savannah, Georgia, reported four cases at that time. H. F. Harris,[6] of Atlanta, reported the disease in Georgia in 1907. In 1915, E. J. Wood[7] called attention to it in North Carolina. From 1912 to 1917 Ashford, working in Porto Rico, did much to arouse interest in the existence of the disease in the Western Hemisphere, and to him we owe a great debt for this study of the etiology.

Etiology.—The etiology of sprue is still unsettled. Musgrave[8] showed the frequent presence of the colon bacillus in various organs of the body in sprue and was able to demonstrate agglutination with the blood of the patient in some instances. In 1914, Manson and Bahr[9] reported the occurrence of the *Monilia albicans* in the lesions of sprue, and it seemed reasonable to believe that this organism was the cause of the disease.

Further studies by Ashford[10] revealed the fact that another organism was frequently associated with the disease. He carried out extensive investigations, employing Sabouraud's medium, and various fermentation and coagulation tests, and succeeded in isolating an organism described by him as the *Monilia psilosis*. This organism differs widely from the *Monilia albicans* above referred to. This work to a large extent has been confirmed by E. J. Wood,[11] working in North Carolina, as well as by Baumgartner[12] and Smith in New York.

More recent studies by Ashford[13] have added to the monilia theory the suggestion that some deficiency plays a role in the disease causation. He says that sprue is preceded in many instances by a physiologic glandular deficiency recognizable by a deficiency syndrome in which pallor, lassitude, mental hebetude and gastro-intestinal derangement are prominent. In this condition there is marked reduction in the output of the digestive glands, especially the pancreas. Further studies by other observers have shown that there is also a lowered blood calcium in a rather high percentage of cases. T. R. Brown[15] reported five cases of sprue in 1921 in which there was an absence of pancreatic secretions with subsequent improvement when pancreatic extract was employed in the treatment. The symptoms in each case were typical. Ashford, by using Collip's extract, is able to reduce muscle cramps and cause a rise in the blood calcium. This explanation of the cause of the disease is undoubtedly more convincing than any of the other theories heretofore advanced, but there are many investigators at the present time who are not willing to accept it in its entirety. Many still regard sprue as a metabolic disease.

Long residence in the tropics is regarded as essential in the production of sprue. Many cases have developed years after the patients have left the tropics and while they were living in such a climate as Boston or London. Wood reports a case of a man living in New England who developed the disease 25 years after having moved from the Southern states.

McCarrison has contributed a noteworthy work on experimental sprue. Monkeys fed on a

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vitamin-free diet showed pathologic changes in the intestinal tract strongly resembling sprue.

Morbid Anatomy.—Students of sprue have been particularly limited in their study of the morbid anatomy of the disease on account of the scarcity of post-mortem material. Death from sprue uncomplicated by another disease is rather rare.

In those cases reported by Manson, Brown and Bahr the intestinal tract, chiefly the ileum, bears the brunt of the pathological changes. The villi are lost, the muscular coat is atrophied, the serous coat is usually unaltered and the submucosa has undergone rather irregular hypertrophic fibrous change. There is a general superficial erosion of the whole intestinal tract from mouth to anus. The bowel is frequently covered with a layer of mucus containing yeast cells and branching mycelia. The liver is vaguely described as atrophied, but this may be little more than the general atrophy that is found. The mesenteric glands are frequently enlarged. The pancreas is frequently the seat of inflammatory changes, according to some observers. Various other workers have described findings which more or less confirm the above.

Symptoms.—The symptoms of sprue are subject to many variations, and in comparatively few cases is the picture a complete one. Ashford says that formerly for a diagnosis four signs were required: (1) a typical tongue; (2) a gaseous bowel; (3) the characteristic stool; and (4) a small liver. To this chain of symptoms Wood adds: (1) the presence of an anemia which is usually accepted as of the secondary type, and (2) a varying loss of weight.

Manson's classical description of the mouth and tongue of sprue is worthy of particular note. He says that there is a general denudation of the epithelium, there are small vesicles from which small ulcers develop, larger eroded areas which may occur on the soft palate, congestion and swelling of the fungiform papillae and atrophy of the entire body of the tongue during remissions.

The color of the tongue in sprue is a rather characteristic pink, as contrasted with the much deeper shade of red found in pellagra, a disease with which sprue is frequently confused. Soon after the mouth symptoms become established the diarrhea appears. At the onset it is accompanied by some pain and tenesmus. The stools are dark and liquid. This is different from the true sprue diarrhea which follows. True sprue diarrhea is unattended by pain or tenesmus. The movements usually occur in the early hours of the day and are infrequent or absent after midday. The character of the stools is distinctive. The large size suggests pancreatic deficiency. The color is light, reaction is decidedly acid, and the fat content is usually high.

There is usually a wide variation in the results of stomach analysis in these cases. Some observers report a high free hydrochloric acid content, while others report cases where the free hydrochloric is very low and in some cases an achylia exists. The occurrence of an achylia has caused many investigators, Simon,[14] Baumgartner[12] and Smith, and others to call particular attention to the close relationship between this condition and primary Addisonian anemia. There occurs early in the disease an anemia which is regarded as secondary. This anemia is characterized by a low color index early in the disease, but the color index usually rises later on. Late in the disease it frequently rises from 1.25 to 1.5 and even higher in exceptional cases. The morphologic changes do not usually suggest primary anemia. Nucleated red blood cells are usually absent. There is no variation in the fragility of the red blood cells to hypotonic salt solution. There is generally a leucopenia.

The case that we are reporting is out of the city and could not be present today. The patient is a white man, married, age 54, a printer, who was seen January 19, 1929. He complained of swelling of the feet, ankles, penis and scrotum, with diarrhea which was worse at night, weakness and sore mouth.

He had had typhoid fever in 1908, when he was quite ill. He denied other serious infections and illnesses, including venereal disease. He had lived in the tropics for eleven years. He moved away four years previously and returned to the United States, after which the present illness developed.

Eighteen teeth were extracted under a general anesthetic three years before I saw him, soon after onset of the present illness. There was slight palpitation on exertion, without dyspnea. There was also some swelling of the extremities which had appeared about two months before. The appetite was good. He ate a general diet. There was no sour regurgitation nor flatulence. There was a diarrhea, worse at night, when he had three to five stools. He had only one stool in the day. There was no blood nor mucus in the stools. He urinated three to four times during the day and two to three times at night. He had been married 17 years. His wife was living and well. There had been no pregnancies.

The present illness began three and one-half years before, soon after he returned from the tropics. He had a sore mouth and tongue with ulceration of gums and gingivitis on account of which he had had all his teeth extracted, without improvement of symptoms. There was a diarrhea with large, dirty, frothy stools, worse in the early morning hours. It did not trouble

him during the day. There was little pain or tenesmus on going to the stool.

Two months previously his feet and ankles began to swell and seemed to be getting a little worse. He had been under observation elsewhere for the preceding three years. During this period he had been comparatively free from symptoms for a few weeks at a time, but they had always recurred. At present he felt quite weak and tired out, although he was able to work.

Upon physical examination the patient presented a rather striking picture of undernutrition. His weight without clothes was 107 pounds, his height 5 feet 6 inches. This is approximately 43 pounds below his ideal calculated weight. The ribs and clavicles were very prominent. The skin had a definite yellowish tint. There was a slight subicteroid tint to the sclerae. The mucous membranes were quite pale. The eyes were normally prominent. The pupils were round, equal and reacted actively to light and accommodated. The fundi showed the disc outlines clear cut and distinct. The whole retina was rather pale. There were no hemorrhages. The vessels were normal. He wore complete upper and lower dentures. The tongue was pinkish and rather smooth on the edges, with slight papillary atrophy. There were no ulcers in the mouth. There was no general glandular enlargement. The thyroid was small. The lungs were entirely clear on percussion and auscultation. The heart was normal in size. A faint systolic bruit at the mitral area was poorly transmitted. The rate and rhythm were normal. The radial vessels were slightly thickened. The blood pressure was 110/60.

The abdomen was scaphoid in shape, with slight general resistance throughout. There was considerable gurgling and fullness in the region of the cecum. The spastic descending colon could be felt in the left lower quadrant. No masses were made out. The liver edge could not be felt. Dullness extended to within one fingerbreadth of the costal margin. The upper margin was the sixth rib in the mamillary line. The spleen was not palpable.

There was slight edema of the penis and scrotum, no evidence of hernia, and no scars on the penis.

There was definite pitting edema of both ankles and tibiae.

The reflexes were present and active.

Laboratory Studies.—The urine was negative except for a slight trace of albumin with no casts. The stool contained occult blood and mucus. It was large, frothy and very acid. The *Monilia psilosis* was not isolated from the stools.

After a Ewald test meal, the stomach contained 6 per cent free hydrochloric acid and 19 per cent total acid. No blood was found in its contents.

BLOOD EXAMINATION

Hb. 39%.
R. B. C., 1,820,000; W. B. C., 3,200; C. I., 1.08.
Differential:

P. M. N.	54%
P. M. E.	1%
Lymphocytes	36%
L. M.	3%
Megaloblasts	6%

Smear: Marked anisocytosis and poikilocytosis. Polychromatophilia and anemia suggestive of bone marrow regeneration.

The Wassermann was negative.

A gastro-intestinal series showed an atonic colon with spastic areas.

TREATMENT AND COURSE

During the previous three years that the patient had been under observation all the well known remedies had been tried. He improved for a while on a general diet, which included two pounds of strawberries a day, "the classical cure." Later, on account of obvious pancreatic disturbances, he was given pancreatin grains 10 combined with parathyroid extract and calcium lactate three times a day. This seemed to be quite helpful at the outset, but the diarrhea returned after a few weeks. Tonics of iron and arsenic, together with hypodermic injections of Fraisses' ferruginous ampoules were given with very little effect on the anemia. He was put on a general diet which excluded cane sugar and flour of all kinds, the kind of diet that Ashford suggests.

DIET LIST

On getting up, 6 to 7 a. m., one large cup of milk with very little coffee. Two or three fried plantains.

Breakfast, 9 to 11 a. m., every kind of ripe fruit: mangoes, oranges, bananas, watermelon; eggs fried or boiled or poached; green corn; meat or chicken. Green plantains boiled or fried to accompany the meat. Any kind of green vegetable. Cheese, cream, one glass of milk. Black coffee without sugar. Saccharine may be substituted for sugar. The green plantains take the place of bread very well.

2:00 p. m., some kind of aerated water or the liquid contained in a fresh green coconut.

Dinner, 5 to 7 p. m., the same as breakfast. No sweets of any kind.

8:30 to 10 p. m., glass of milk.

This diet is quite similar to the well-known Ashford diet which is widely used in the treatment of sprue in the tropics. Dr. Carlos Duran, of San Jose, Costa Rica, in a monograph entitled "Some Observations on Sprue in Costa Rica," which appeared in the *American Journal of Tropical Medicine* in July, 1924, strongly urges this diet and has reported several cases in which splendid results were obtained where it was used.

The chief aim of the diet is to eliminate all articles which contain cane sugar and flour.

Ten days later the patient reported to the office. The edema was very much less. He was following the diet rigidly, and in addition was limiting the salt intake somewhat as well as restricting his fluid intake to two liters a day.

Blood count at this time showed: 35 per cent hemoglobin, 1,376,000 red blood cells, 4,475 white cells and a color index of 1.29. The smear showed marked anisocytosis and poikilocytosis with 6 nucleated red blood cells in a count of 200 cells. The urine was free from albumin.

Two weeks later, February 28, 1929, the patient reported for observation. He had been on the Ashford diet for three weeks. Except during three nights the stools had been normal. On two occasions he ate cucumbers with vinegar and followed this with strawberries and cream. He said that he had felt much better during the previous three weeks.

One month later there had been a slight improvement in the blood picture. The hemoglobin had gone up to 42 per cent from 35. The stools had been perfectly normal for the past month and formed for the most part. Edema had entirely disappeared.

April 29, 1929, three months after starting the Ashford diet, the patient reported that the stools continued

to be formed. There was occasionally one stool in the early morning. The mouth had been a trifle sore for the preceding three days.

Blood count showed 54 per cent hemoglobin, an increase of 12 points. There were 1,890,000 red blood cells, an increase of one-half million. There were 4,800 white cells, as before. The color index was 1.4.

May 13, 1929, or approximately four months after beginning the diet, there had been a slight exacerbation in the condition with two to three stools each night and a loss of weight of 5 pounds. His wife said that he had broken over from his diet schedule and had eaten several pieces of pie and a slice of cake recently, all of which contained flour.

On June 15, 1929, the patient was put on three vials of Lilly's liver extract 343. After two weeks the hemoglobin had increased to 62 per cent, the red cells to 2,530,000, and the white cells to 5,100. The color index was 1.24.

Smears showed the presence of nucleated red cells in greater numbers than were present two months before.

Monilia psilosis vaccines which were used by Ashford in the treatment of his cases of sprue were not employed. At the present time the patient has gained 9 pounds in weight, has shown an increase in his hemoglobin from 39 to 65 per cent, and in red cells from 1,820,000 to 2,700,000, and an almost complete disappearance of all gastro-intestinal symptoms.

In closing we shall make a few remarks relative to the prognosis in this disease. Sprue is always to be regarded as a serious disease. In many cases, good results may be obtained if treatment is instituted early and the full cooperation of the patient is secured.

It is a disease of great chronicity marked by remissions of varying lengths, so that all prognoses should be guarded.

In a series of cases observed by Musgrave in Manila, the mortality was 31 per cent. Considering the gravity of the disease few die, but the more or less chronic invalidism caused is a serious economic problem in many places. In North Carolina Wood saw more severe cases of sprue than he saw in London in patients from the East, and it seems probable that the disease in America is assuming a more serious form than it has in the average Asiatic case.

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VOLKMANN'S CONTRACTURE*

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Recently we had five boys from four to eight years old under treatment at the same time for forearm deformities following Volkmann's contracture. We were so impressed with the similarity of their primary injury, which was an unreduced elbow fracture, that we investigated our own records and looked through available literature to find that most reported cases, where the specific lesion was described, followed an unreduced fracture through the lower end of the humerus.

Eikenbary, in reporting 21 cases of Volkmann's contracture, traced all of them to this type of fracture, and had not seen a Volkmann's produced by any other lesion about the elbow.

Faulty position alone does not cause the ischemia, but contributes to it, by increasing the trauma and obstructing venous drainage from the forearm. Early reduction of badly deformed fractures lessens the trauma from edema and hemorrhage, and is the greatest safeguard against the deformity. However, such fractures, remaining unreduced for some hours or days, accompanied by extreme swelling, should not be manipulated until the swelling subsides. Should cyanosis increase, drainage of hemorrhage from the ante-cubital fossa should be done.

A fracture may be early and properly reduced, but with tight splinting, or extreme flexion, there is the same limitation of venous re-

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turn, and a pathological basis for Volkmann's contracture. It would seem, therefore, that most of the factors contributing to this serious complication are avoidable; but this is not entirely true because most of us have seen cases in untreated arms with contractures.

Hey Grove called attention to the circulatory change in the flexed forearm, after an ounce of saline was injected under the deep fascia in front of the elbow. Lord reported a case of hemophilia with hemorrhage into the antecubital fossa, in which a well defined Volkmann's syndrome followed. The other arm was similarly involved at a later date. Denuce, quoted by Lewis, reported 36 cases out of a total of 97 studied, in which no dressing had been applied. Taylor calls attention to the fact that the whole flexor group of forearm muscles is surrounded by a firm, unyielding covering of aponeurosis and bone. Extensor muscles are also covered by a similar envelope, but are seldom involved. The flexor group bears most of the damage, because it forms a prominent mass, and surrounds the large vessels, and is therefore liable to greater traumatic infiltrations.

The original conception of Volkmann was that the contractures in muscles were ischemic in origin, and due to cutting off the arterial blood supply, while the generally observed venous stasis seemed only to hasten the onset of paralysis. More recent experimental work, by Brooks, Jepson and others confirms the clinical observations that it is not arterial obstruction, but acute venous stasis which is the etiological factor in this condition.

The progressive myositis with fibros's leading to contracture may be associated with nerve injuries, but the latter are incidental and not the causative factor in myositis.

One of our patients, a child aged four, with an unreduced fracture through the condyles, was seen two weeks after the injury with total paralysis from the elbow down. With beginning return of sensation and motion during the fourth week, there was first noted the flexion contracture in fingers and hardening in flexor muscles, indicative of Volkmann's contracture. The nerve injuries continued to improve and the tendency to contracture became more pronounced. This child's history was of an injury which was without treatment for twenty-four hours. At this time there was marked swelling about the elbow and forearm, and some numbness in the hand. Without anesthetic it was put up in acute flexion. After forty-eight hours, because of increased numbness, swelling and the appearance of blebs, the adhesive dressing was removed and the elbow left in a sling at a right angle position. This case illustrates how an extreme degree of pressure from infiltration and position may produce nerve blocking and venous stasis, the latter in turn precipitating changes in the muscles leading to ischemia. We have had several other cases with complicating nerve injuries, but less extensive.

The symptoms are: first, pain with rapid swelling soon after the dressing is applied, accompanied by cyanosis of fingers, hand and forearm. In severe cases blebs appear on exposed surfaces, and skin sloughs occur at points of maximum pressure. The damage to muscle occurs within the first forty-eight hours. The contracture may start within a few days, or as late as six or eight weeks. However, it is usually noticed immediately after the dressings are removed. The deformity is rather typical. The wrist is carried in flexion and cannot be extended without flexion of the phalangeal joints. The forearm is pronated, the flexor muscles are hard and fibrous, with atrophy pronounced.

In nerve injuries, the median and ulnar are the ones usually involved. In primary nerve injuries there will be a sensory and motor loss, corresponding to the extent of the damage to the nerve substance. The secondary damage is from pressure by swollen muscles and tight dressings, or it may occur after several weeks from scar contracture. In secondary involvement, the nerve function is usually impaired rather than lost. These are followed by trophic disturbances giving a thin, glossy cold skin to the hand. They have thick, brittle nails and get ulcerations on the ends of the fingers from slight injuries.

There is perhaps nothing in the realm of medicine and surgery in which prevention is as important, and is as easy of attainment, as in Volkmann's ischemia. Likewise, there are few conditions less satisfactorily treated than this condition when well established.

Prevention involves knowledge of the changes which may occur, and prompt measures to prevent or remedy them. Early and gentle reduction of fractures under an anesthetic, to lessen the soft tissue damage, and assiduous attention to application of dressings and observation of the patient during the first forty-eight hours comprise the essential features in prevention.

In the treatment of elbow fractures, many seem to have gotten the impression that placing the elbow in the Jones position of acute flexion constitutes a reduction. This was never taught by Sir Robert Jones. The reduction must be accomplished first by gentle manipulation of a relaxed patient, not forgetting that the position of the lower epiphysis is not straight, but directed forward at an angle of about 45 degrees

or more, which varies with the age of the patient, as shown in a very excellent article by Dr. Isidore Cohn.

After reduction, the position of full flexion is ascertained and eased off a few degrees before the dressing is applied. The parents should be instructed in regard to circulatory changes, and to return for inspection the following day.

After the deformity has developed, no plan of treatment which we have followed has been very satisfactory. We have had best results from a combination of physiotherapy measures, consisting chiefly of baking, massage and passive motion, with fixed extension, on splints, and the operative release of the flexor muscles at the medial epicondyle and transplanting them to the ulna as described by Max Strange. We have added to this, in some cases, a release of the pronator teres insertion and also the pronator quadratus to improve supination. Following this plan, we have had several very excellent results, an equal number of fair results, and a greater number of poor results.

We have not done a bone resection in any case, but have done a neurolysis in a few instances without satisfactory results, and have lengthened the tendons at the wrist, which has not proven, in the few cases done, so satisfactory as the method of transplantation.

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DISCUSSION (*Abstract*)

Dr. Isidore Cohn, New Orleans, La.—In working about the elbow, early and complete reduction is an essential procedure.

The fact that there is a definite relationship of the capitellum to the sigmoid cavity is not thoroughly appreciated, and was brought out very nicely by Dr. Driver's pictures. The lower end of the shaft was impinging on the coronoid process of the ulna. Naturally, there is going to be limitation of motion in a case of that type.

I do not believe that it is sufficiently appreciated that we may expect Volkmann's ischemic contracture to develop in less than a forty-eight hour period. Dr. Taylor, of New York, reported some eighteen or nineteen years ago, a case which occurred within six hours, and it was a misfortune of mine that one of the resident staff of Touro Infirmary did not believe in a certain form of dressing and a case developed in our service within twelve hours. The important thing which was overlooked was the fact that if you are going to put on a dressing with the elbow in flexion, the hand and fingers must be included. If you stop your dressing at the wrist a vicious circle develops.

If there is a hemorrhage about the elbow, the surgeon must not be timid with his knife. If he takes care that blood does not accumulate there, we shall have less fibrosis.

It was my misfortune to have inherited a case that had been under observation by a physician for seventy-two hours. When I saw the patient the hand was blue, and there was great swelling about the lower part of the arm. I suggested making an incision. Much to his surprise, a great deal of blood came out. The boy, fortunately, is improving.

Dr. Dickson, of Kansas City, has been impressed with the importance of nerve injury. I do not believe that we can afford to consider nerve injury the primary condition. There are certain instances where the nerves are injured, but we have to consider the mechanical side first.

Dr. Frank P. Strickler, Louisville, Ky.—We not infrequently get ischemic paralysis immediately upon the reception of the injury. It is not always necessarily due to the application of splints, by any means. For instance, you see a child run over by the wheel of a tractor. There is a destruction of the muscles. Ischemic paralysis is ischemic myositis, and has nothing to do with the nerve injury at all. Very seldom do you see a nerve injury in these cases.

I have had quite a little experience through the Kentucky Crippled Children's Commission with this type of case. I think I have seen about ten cases in the past year, so the condition is not uncommon.

I would suggest that when you first see a case of this type that has a traumatic injury, you make multiple incisions with a tenotome in the fascia over the

muscles, because a hemorrhage is taking place in the muscles and with increased pressure, there is an ischemia of the muscles. The incisions through the fascia relieve the pressure and permit the muscles to get a better blood supply. When you use the tenotome, you really do a decompression operation on the muscles. If you do this when you first see these cases, you have done all that is possible to prevent ischemic paralysis. Personally, I have had better success with the Jones than with any other type of treatment. I have tried shortening of the bones, stretching, tenotomies, and so forth.

Recently, I have been in communication with Dr. Adson, who is very optimistic on the subject of ganglionectomy. He believes in removing the stella ganglion, posteriorly, by resection of the first rib. In this way, he thinks he will be able to overcome the contractions of the hand and forearm. There is definite room for improvement in the treatment of this type of case.

Dr. Guy A. Caldwell, Shreveport, La.—Dr. Driver emphasized the prevention of Volkmann's ischemia, but did not explain one of the most valuable measures to be used.

A case that I saw some months ago will illustrate this point. The patient was a young child who had a supracondylar fracture of the humerus which had been reduced completely under anesthesia immediately after the accident occurred. The arm was bandaged in moderately acute flexion and post-reduction x-rays were made. The surgeon was careful to see the case again within six hours after reduction because of complaint of pain. At that time the swelling was intense and there was some pain, so the surgeon let the arm down to a right angle. He saw it again six hours later, and because the dangerous swelling persisted he straightened the elbow to almost 180 degrees. In spite of the above measures the pulse became fainter at the wrist and he, therefore, made multiple punctures through the skin and fascia about the elbow to permit the escape of blood and serum; nevertheless, the child developed a typical Volkmann's ischemia. Six months later the flexor muscles were hardened and contracted, but the bone fragments were firmly united in good position and the elbow motion was excellent.

The one error in the management of that case was in not making long incisions in the skin and deep fascia about the elbow instead of multiple small punctures. When extension of the elbow fails to relieve swelling and increase the volume of the pulse, one should never hesitate to make liberal incisions extending down through the deep fascia in order to relieve the tension. The most needed lessons in the prevention of Volkmann's ischemia are to watch the arm closely and frequently during the stage of swelling, to lower the forearm if necessary and to make liberal incisions through the deep fascia when less flexion fails to relieve the tension.

Dr. Driver (closing).—Drainage of hemorrhage from the antecubital fossa with us has been satisfactory.

For puncture, we open the arm and make a free incision.

A PLAN FOR FULL-TIME TEACHING IN CLINICAL DEPARTMENTS*

By JOHN WALKER MOORE, M.D.,
Louisville, Ky.

The clinical departments in a medical school present a very troublesome problem in our so-called university plan of instruction. A decade ago the heads of these departments in most instances were men of unusual skill and ability. They were endowed with a personality that attracted students and patients alike. Their popularity with students grew no less than their social relations and obligations to patients. They were thus clinicians, if you please, a law unto themselves, who had long since drawn away from academic environment and control to the determent of their departments and future of their medical organizations. The major part of their income came from practice outside of the hospital and only in a few instances were salaries paid which would defray even a portion of the cost of a physician's living.

The pre-clinical departments also presented a problem in the past not far afield from that just described. In many instances the salaries of the occupants of non-clinical chairs were far below the living wage, as the result of which additional income had to be sought during the teaching months. We find these men engaged in a variety of pursuits, the majority of which were totally foreign to their school activities. After a time a feeling prevailed among physicians that such outside work was not in keeping with scholarly study and that the dignity and high-mindedness of a teacher's calling were being jeopardized. This feeling, sincere in its purport, was so generally aired in private and general medical circles, that the wave bearing "full-time" pre-clinical teachers struck our universities long before the trustees were in a position to act. Being true Americans, however, our university authorities acted, or we should say, overacted from the dictates of their conscience rather than from an ample and ever-ready elastic university budget. So with one clean sweep we find our pre-clinical departments on a university basis. In some of the universities a few of our great teachers and investigators weathered this stormy period by suffer-

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ing heavy financial and social penalties. In other less fortunate institutions we found an alarming condition of affairs. The deans were practically helpless. They were without sufficient funds to build up several full-time preclinical departments, and even where available funds were at hand, desirable full-time timber was lacking. Many institutions were obliged to use as heads of departments instructors who were seeking salaried positions. Few of them were teachers, students or investigators.

Although our trustees have been seemingly slow in backing the financial side of the university basis for pre-clinical teaching, nevertheless the progress in all Class A schools has been sound and in most instances entirely satisfactory. At the present time we are able to select our department heads or professors for the preclinical branches from men of skill and learning, who may or may not have attracted students by their personality, but who have attracted the attention of schools by reason of their scholarship, research and profound interest in university activities. Now-a-days the heads of departments in these branches of medicine, many of whom carry degrees other than doctor of medicine, have all been brought up in a university atmosphere. They are at no time unmindful of their responsibilities as heads of a department and it is needless to say they devote much time in perfecting a smoothly running organization.

Compare the pre-clinical organization which we have outlined with the clinical departments of this country which operate upon the so-called full-time principle. We may say at the outset that we find no great unanimity of practice in schools that foster this idea. In one university the professors are free to take as many private patients as they care to in the teaching hospital and visit private patients outside of the hospital if they so desire, in each instance with the privilege of collecting fees. In another school flying full-time colors the professors are allowed a limited number of private beds in the university hospital, collect fees for themselves, and have the privilege of opening a down-town office where the well-to-do patients have been taught to go. Compare the methods of the above universities with a school in which the professors are not permitted to examine or care for patients outside of the teaching hospital, much less allowed to receive fees from private patients treated by them in the teaching hospital. Can we say that these schools are functioning under the full-time system? If so, what does full-time convey? It certainly conveys a different meaning from that expressed in the term university basis, the principle under which our pre-clinical men are working. It appears that we are attempting to follow a principle that is generally accepted by our schools, but the method of its application has not been agreed upon. Or to put it in another way, the principle is accepted by all, but owing to financial difficulties, on the one hand, with physical impossibilities, or discordant opinions in our faculty concerning pay positions on the other, the method of application is necessarily carried out in a haphazard manner. It is in these varied and contradictory ways that the term full-time is being used at the present date, and in no other sense should we choose to keep within the good graces of all concerned.

I prefer to interpret full-time clinical teachers as those occupying pay positions with salaries sufficient to free them from the necessity of earning any part of their livelihood by doing outside work, without the right of accepting fees for professional services; with the understanding that the time and energy of these men, whether directed toward research, teaching or caring for patients, are not to be hampered by strict university regulations. I dare say it would be very unwise for the management to limit the teaching of full-time men to the study and the treatment of cases that happen to be on a free ward or in a free dispensary. We have long since realized that the passing on of the proper methods of handling private patients is by no means unessential in the training of our students. The art is rarely picked up or rarely cultivated in this restricted form of practice. It would be infinitely wiser to permit consultation and limit the private beds in a teaching hospital to this staff, especially should the bed space of the hospital be greatly sought by the non-pay members of the staff. Under this interpretation of full-time clinical teachers the question arises, where best can they be used? First and foremost we would say, as heads of major departments, for the reason that the success of a department depends largely upon its head. The duties of this man are varied and more far reaching than those of similar position in our medical organization. From the fact that medical schools, in addition to training physicians, are being used more and more by private hospitals in organizing and centralizing their work under combined hospital and university regulations, this man should have not only scholarship, research and administrative abilities, but

he should be able to deal with his part-time and non-pay staff in a generous manner, and in addition he should possess a striking personality for meeting the public. Many of these qualifications are "born in a man and not made to order."

I am not convinced that all the key positions in a major clinical department should be occupied by full-time men, if suitable part-time men are available. This statement is made for the reason that, if full-time men occupy these positions, it would be humanly impossible to advance them as time goes by, either professionally or financially according to merits of attainment. The obvious outcome is inevitable. On the other hand, every well organized department now-a-days turns out yearly resident physicians or instructors of three to four years' training in university work. Surely some of these men can do creditable research, supervise in dispensaries or routine laboratory procedures, demonstrate in clinical chemistry or assist in the x-ray department. Indeed, the majority of these men will do credit to our teaching staff. They were selected in the beginning from a large number of applicants and their advancement from year to year rested solely upon merit. The university profits no less financially by this arrangement than the community which is the recipient of high-grade medical service. These men, when given definite responsibilities, do not feel that they occupy an inferior position in the organization, nor do they censure the university for any financial shortcomings that may befall them from year to year.

The part-time system is not immune from pitfalls, but most of these can be obviated by having in the beginning a mutual understanding as to the work assigned and hours required by the university. The most serious pitfall that we have met is the tardiness with which some of our men report for duty. We grant that a practising physician encounters an emergency in his practice from time to time which forces him to report late for duty. In such a case the head of a department can readily shift men in the organization to fill the place of a member who is occasionally detained. On the other hand, the teaching methods of a department can be severely handicapped by having one or more of its members habitually held up in outside practice other than emergencies. To overcome this shortcoming, we employ the method of having our part-time men sign in a register the time they report and the time they go off duty. This method should not be regarded by part-time men as any more of a punch-clock system of Ford's fame than it is for the unpaid staff who are required to carry out the same procedure in private hospitals. When the policy is adopted in general by the university, it simply resolves itself into the expediency of the dean's notifying the head of a department when one of his members is not living up to the spirit of his contract. This problem is solved in some centers by having part-time men use the university hospital for most of their private work. This method of course is ideal, but many of our schools are not so fortunately situated.

So far we have confined our discussion of the teaching of medicine to professional teachers, and have attempted to set forth the idea that the science of medicine can best be drilled into students during their four years of medical training by an organization of paid teachers who have had excellent scientific training, and who are themselves in the closest touch with medical science. We do not intend for this statement to imply that the practitioner of medicine should have no place in our organization for the teaching of undergraduate medical students. The practitioner has a definite place in our curriculum, and I pity recent graduates who are deprived of this feature in their medical training. It has been said that perhaps the most important function of the practitioner in the modern medical school is that of a liaison officer between the university professors on the one hand and the general practitioner and the public on the other. It has been hinted that the instructional teaching of the practitioner be narrowed mainly to that of the healing art, and that he be permitted to carry out his task in the amphitheater clinic, if he be of professional rank, or if he be young and of lower rank, in the outpatient department. The practitioner can and does in many instances play the role of the middle man, even though the burden oftentimes is obnoxious and unbearable. We should not lose sight of the fact, however, that many of our practitioners are scientists as well as the professional teachers are, and in certain branches of medicine are frequently foremost in their field. Surely these men can be used to great advantage by our medical school organizations not only in rounding out scientific instruction, but also in carrying out creditable scientific bedside teaching while imparting the

healing art. The judicious use of these men in clinical teaching is a declaration on behalf of the university in support of the altruistic aims and ideals of the medical profession.

Discussion follows paper of Dr. Chaney, page 964.

THE ROLE OF THE PART-TIME TEACHER IN THE MODERN MEDICAL SCHOOL*

By I. I. LEMANN, M.D.,
New Orleans, La.

A consideration of the part-time teacher in the modern medical school begins logically with the question, has he still a role to play? The improvement in the type of instruction since the introduction of full-time teachers is unquestioned. There were many evils when the instruction was left entirely to part-time teachers, indeed to teachers who were such only secondarily and incidentally. Their chief interest not only in a pecuniary sense was the practice of medicine. Naturally, this success of full-time teaching has prompted some to believe that the logical evolution of the medical school lies in the development of complete full-time departments to the practical exclusion of part-time teaching. If this were true, today's discussion would become entirely academic. This evolution, however, cannot and should not take place. In the first place, the financial difficulties would appear to be insuperable even to the richest school. The demands for the extension of investigative work and for more intensive handling of patients not only from the purely medical, but also from the social point of view, are boundless and there is no institution that has not at all times upon its horizon problems urgent and alluring which demand financial assistance and whose claims may more strongly be supported than those of a complete full-time teaching staff. As it is, the budgets of even inadequately manned partial full-time departments have reached such limits as to represent the interest on very large sums of money and when the extension of the principle of full-time teaching to all departments in all details is contemplated, one realizes that the sum total of all endowments for such purposes reaches an amount beyond all reasonable expectations. One may reasonably say, therefore, that aside from any question of desirability or justification, part-time teaching must be regarded as a necessity. If, however, part-time teaching is an evil, no matter how necessary, one might stop the argument here and urge that the Herculean task of raising adequate funds with which to abolish it should be assumed and persisted in.

There are, however, other considerations which soon come to mind to support the contention that part-time teaching is not an evil, but a desirable thing in itself apart from all financial considerations. In a complete full-time department one must agree that it would be possible to have but a couple of older heads, more matured by some years of bedside experience, whether in the hospital or in the home or office. To touch only fleetingly again on the matter of financing, it cannot be expected that the reasonable budgets would cover proper salaries for more than two, or at the most three, mature men. Such men would not be available in numbers larger than these, even if the funds could be had. There are few men, no matter how deeply interested in the science of teaching medicine rather than in the healing art itself, who could be persuaded to remain more or less indefinitely in subordinate positions and, indeed, it may be said that men who would be willing so to remain would only exceptionally prove to be the kind of teachers of greatest use to the students. It may be assumed, therefore, that in a full-time teaching department, the rank and file of the instructors would consist of men fresh from their internship and men continuing research work in more or less narrow fields.

Many voices[1] have been raised against such an organization. MacKenzie[2] wrote:

> "The final and most important of all branches of medicine is the assessing of the value of symptoms. As soon as a doctor is engaged in general practice he finds out the importance of this aspect of symptomatology. After detecting a sign, the patient's inquiry, expressed or implied, is naturally, 'What is going to happen to me? Is this a sign of disease that will shorten my life or cripple me?' It is manifest that if symptoms are ever to be properly valued, it can be done only by those who have the opportunity to watch the individual patients through long periods of time, who see the disease at the earliest stage, or even before its inception, and who can observe its progress through all the vicissitudes of life. Manifestly that cannot be done by the worker in a laboratory or in a hospital ward."

I might add that experience gained in an outpatient clinic will not entirely furnish the kind of experience to be obtained by the intimate personal contact with patients in private practice. MacKenzie goes on to contend that:

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"It has been a misfortune to clinical medicine that the laboratory worker has been allowed to dominate the field of research. In many cases he has gone after purely academic problems, leaving unrevealed a great many phenomena which baffle the physician in his work. The faith in an involved technic has resulted in the simple and easily recognized manifestations being too often ignored, while those that are revealed by some elaborate mechanical implement are extolled as being the more scientific."

The young assistant, brought up in the hospital, cloistered so to speak in an academic atmosphere, not subjected to the buffets of fortune and the normal worries and anxieties of personal service to personal patients, is long in acquiring, if he ever does, the knowledge and judgment necessary to assess the value of symptoms.

"It is a great mistake to believe that this is a field of knowledge that requires no special training for its acquisition."[2]

The part-time teacher, therefore, has some very definite contribution to bring to the teaching of the art of medicine. To this, if gained by experience in that proper laboratory, namely, the field of private practice, is to be added also the advantage offered by practitioners in specialized fields of endeavor. Practitioners in such specialized fields as ophthalmology, otolaryngology, dermatology, like those in even narrower fields such as cardiology, endocrinology and gastro-enterology, have all something worth while to contribute from their accumulated experience, something which even equally mature men who have grown up only in the hospital and in the medical school have not had the opportunity to acquire.

Let me not be misunderstood. I am not contending in behalf of those practitioners and part-time teachers who desire to hold their teaching positions only for the kudos. Ralph Major[3] was quite right in pointing the finger of scorn to the

"'limousine instructor' who drives up in state, lectures to the students for an hour about the important personages he has treated and then closes with a remark about some oil millionaire he is on his way to see, dashes out and leaves the impressed students to watch him roll away in his limousine."

This type of instructor has practically disappeared. There are, however, men engaged in the practice of medicine who have a keen interest in science and an earnest desire to keep abreast of all the newer developments; some of them even contribute in a large and important measure to these developments themselves. These are men who not only have a real message for the students, but also find inspiration in this contact and stimulus for their own work. The medical school, no matter how rich, which fails to avail itself of the services of such men is not fulfilling its duty to its undergraduate students who are the practitioners of the future nor to those more mature students who are the practitioners of today.

If, then, one agrees that the part-time teacher on the proper basis is useful, even necessary, one must ask what this proper basis consists of. I have already alluded to the proper spirit and equipment on the part of the teacher. I wish to elaborate this slightly, for it seems to me, as it has to others, that an undue emphasis has been placed upon the letter of the law of full-time teaching rather than upon the spirit which should animate the teacher, full-time or part-time. Simple honesty demands that the teacher should deliver what he is paid for whether this pay be in the form of salary, title or other indirect emoluments. The full-time teacher, though taking no money from any other source, may just as easily fail to give what the spirit of his contract calls for as may the part-time teacher, and so long as the medical school gets what the spirit of the contract between it and the members of its teaching staff calls for, it has always seemed to me immaterial whether the letter of the contract demands that no portion of the teacher's time be devoted directly or indirectly to any other purpose. The only concession to be made on this point is that a man receiving a living salary and one commensurate with his position is freed from pressing demands and can devote his time and attention primarily to the teaching. There must always be among the part-time teachers those who are primarily teachers and practitioners only in a secondary sense and those on the other hand who are practitioners primarily and who devote only a minor portion of their time to teaching. Both of these types are of value in supplementing the full-time staff. There should be a constant stream of change and interchange in a department. Young assistants who, after their internship, have served a few years as full-time teachers, should be encouraged to try their wings in practice and to take on only part-time duties. More mature men who have kept abreast of the scientific progress of medicine and who have served as part-time teachers might after a while become full-time teachers. More mature full-time teachers, even heads of departments, as we have known in the past (Dock, Barker

and Thayer) may in turn become part-time teachers or even retire to private practice. This constant stream will serve to keep in contact the art and science of medicine.

If part-time teachers are to be accepted not merely as necessary evils, but as contributing something of equal value with their full-time colleagues, it may rightfully be expected that they be adequately compensated. By this I mean not only adequate salaries for such part-time teachers as devote considerable time to their teaching and titles and standing in the faculty commensurate with the dignity of the positions more mature men may hold, but also encouragement and assistance for the part-time men to develop. Medical schools are too much inclined to look upon the part-time teacher as a fifth wheel to the wagon. The full-time teacher is provided adequately and in many cases bountifully with laboratory facilities, secretaries, assistants, and so forth, so that often he may merely indicate his wish to have something done and it is done. The part-time teacher, on the other hand, receiving nothing from the school more than the prestige of his connection with it, is apt to be looked upon as so wealthy and so resourceful that he should provide these facilities for himself. Too often he is reproached for failing to be productive and his contributions are compared unfavorably with those of his full-time colleagues. Those part-time teachers who, by their interest in the science of medicine and by their devotion to teaching and to the interest of the school have earned the right, should be considered upon the same basis as their full-time colleagues and should be accorded similar privileges. Their interest in the development of the school and their usefulness in its councils should be recognized by according them a proper voice in its conduct and development.

I must not conclude without a deserved tribute to the Chairman of this Conference, my esteemed colleague and honored chief. He is an example of that rare individual who combines a ripe clinical judgment with administrative ability, mature bedside experience with eager zest for investigation and seasoned laboratory training. He has stimulated his juniors to independent research and has cooperated with his part-time colleagues in their desire to make their teaching fruitful.

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Discussion follows paper of Dr. Chaney, page 964.

THE FULL-TIME OR VOCATIONAL TEACHER IN SURGERY*

By RALPH H. CHANEY, A.M., M.D., F.A.C.S., Augusta, Ga.

Educators, as well as education, must show persistent advancement coincidentally with the consistent increase that takes place in fundamental scientific knowledge, or inherent stagnation will result. With the accumulating advances in scientific knowledge, problems affecting the various factors in our pedagogical plan arise. Not only do changes in the mode of instruction or in the curriculum occur from necessity, but changes in the general attitude of the individuals preparing and presenting these changes in educational methods must take place. It is in this latter group of changes that the solution of the when, who and how of the full-time or vocational clinical teacher must be solved.

When one attempts to study the development of clinical teaching in Europe and the United States in contrast, some rather definite facts come to our attention. For instance, we find that Europe has provided the greater proportion of teachers whose names stand the wear and tear of passing years and are recalled long after their active periods of endeavor are past. Thus, while we find in American medical history such names as Gross, Senn, Keen, Murphy, Halsted and Ochsner, who have markedly influenced the course of surgical knowledge and the progress of medical education in this country, their influence as yet does not compare with the world-wide influence of such men as Billroth, Mikulicz, Czerny, Volkmann, Esmark and Bergmann. Again, we study medical literature and we find that up to the last few years American literature, with some exceptions, contains largely the record of the application of scien-

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*From the Medical Department of the University of Georgia.

tific knowledge rather than additions to fundamental truths. To find the origin of new knowledge it is necessary to search the literature of the Old World.

Frankly facing this situation and looking for a cause we find, perhaps, one reason in the fact that in Germany, for instance, medical education has always been allied with the established universities and their closely associated hospitals. The German university has always been the controlling element in every form of education, and medical educators were appointed to their respective positions in the same manner as were the educators serving other branches. The German university was primarily developed and endowed by the ruler of the principality in which it lay in return for the feudal power which was vested in him by his subjects. Thus, from the onset, medical education in Germany was carried on by men who were endowed directly by the state and were not dependent upon the necessities of practice for a livelihood. Under such circumstances a man was able to spend years of his life accumulating a background of anatomy, pathology and pathological physiology upon which to place his surgical training, thus acquiring the information which later he was to present to his students. The ambition of each man was ultimately to assume a prominent place in the teaching faculty of some university. Thus, ability, marked by scholarship and the faculty of presenting his knowledge in an understandable way to students who grouped themselves about him, was recognized rather than his lay following or accumulated wealth.

In the development of medical teaching in our own country, primarily instruction was given by more or less prominent physicians who took one or more students under their supervision until they were able to pass the examinations for entry into practice. The ineffectiveness of this method as compared with the training that the medical student received in the various European centers caused certain physicians to group themselves together as teaching units and in some instances to associate themselves with some existing college or university. While in many instances the fundamental desire to teach for the sake of the inspiration arising therefrom existed, in the majority of instances the burden of teaching was assumed because of the remuneration afforded from students' fees or because of the additional practice which came to the physician concerned because of his prestige as an instructor.

This situation led to that disastrous period in American medical education, when, without regard to clinical facilities or fundamental ability of the teaching staff, large numbers of proprietary medical schools arose, not so much to provide sound education for their students as to provide a means of personal aggrandizement or glory for the instructors concerned. Following this period, the errors of which were pointed out by the investigation of the General Education Board in 1910, a steady, persistent improvement has occurred, due to the consolidation of many schools and the association of practically all of the remainder with some parent college or university. However, in the process of these consolidations in order to promote harmony, the general educational improvement of many schools has been impaired by a superabundance of so-called clinical professors whose fundamental interest is the same as that which activated those men who previously established the proprietary schools. The problem of reconciling practising physicians and surgeons with the advancing trend of medical education is difficult and its solution may take years to unravel. Just where the field of the vocational teacher is to end and where the field of the avocational teacher starts demands much study. One factor is distinctly evident in the study of schools as units. Those institutions which have distinctly rejected the idea of inbreeding have been the most productive in pure medical science. Inbreeding produces a tendency to be satisfied with things as they are and results in a period of intellectual stagnation which can be broken only by the injection of new blood.

No one intelligently studying the problem of medical education would today suggest that the teaching of the so-called pre-clinical principles of medicine should again be vested in the hands of the practitioner rather than in the hands of the trained professional teacher. As a matter of fact, should anyone suggest such a reversal of the wheel of progress, it is doubtful that sufficiently well trained men could be found among the ranks of practising physicians. In fact at the present time it is necessary in a large number of instances to reach out into the field of pure science in order to find men with the training essential to teach our pre-clinical branches. Personally, I delight to see men from the field of pure science come into the medical faculty and cannot see the point of view of those who feel that there is something essentially different in medical education which prevents the scientific man from teaching our pre-clinical subjects.

Chemistry is chemistry and anatomy is anatomy, whether considered as pure sciences or whether considered in their relation to medicine, and it is probably an unwarranted assumption that when they are taught in relation to medicine they are different, which has led to the apparent if not actual decrease in fundamental knowledge of chemistry and anatomy so manifest in our recent graduates.

The problem of introducing the same degree of teaching ability into the clinical years of undergraduate training as has been introduced into the pre-clinical years has led to the introduction of the so-called full-time teacher. Teaching, whether it be instruction in arts, law, engineering or medicine, is of itself a profession. Years ago one of our foremost educators stated that a teacher was born and not made. That statement is probably just as true today. The ability to present a subject so that it is intelligible to the state of mental development which a group of pupils has attained is an art which is not exclusive to any single branch of learning. Thus it is my impression that a man who has the qualities of a teacher could, should opportunity give him time to acquire the knowledge necessary, present in an understandable fashion the facts essential to any profession. Not so long ago Dean Lewis said:

"A man must be an idealist to secure the training necessary to fit him for the practice of surgery, and he is often discouraged in finding that he is handicapped in the competition, discovering frequently that surgery is sold to the highest bidder."

If high idealism is necessary on the part of a man who would obtain the training necessary to fit himself for the practice of surgery, how much greater must be the idealistic factor which promotes the individual to obtain the training which is essential to fit himself to guide and direct the developing mind of the future practitioner of medicine or surgery. If we are to attain the highest degree of intelligence in our medical educational endeavor we must find the means of eliminating this particular competition in medical instruction. I do not mean to suggest that competition should be removed but that competition should be directed toward attaining a high goal as a teacher, rather than a wide reputation as a practitioner. The fundamental difficulty existing in medical education as well as in other lines of educational endeavor is that the remuneration offered in the field of teaching endeavor is still so much below that attainable in the corresponding non-teaching field by a man of sufficient intelligence and proper training as to be a handicap in attracting available material into the teaching profession. Henderson recently in an article in *Science* pointed out that the fundamental need in universities at the present time is more brains rather than more teachers and that until the salary basis of teachers approaches the remuneration obtainable in direct practice the universities cannot attract the intelligence necessary for progress.

Eight years ago Hough said:

"No one can mistake the present day recognition of the truth that for the clinical years of the curriculum the quality of teaching is more important than the quantity of clinical material. Opinion may be divided on the merits of this or that 'full-time' plan; but opinion cannot be divided as to the necessity of vocational teachers of clinical subjects."

That statement, I believe, is just as true today as when Hough made it, as teaching, no matter what its phase, is a real job and must command the very best endeavor of the individual. No matter how intense the interest of an individual may be in teaching, unless he makes it his vocation rather than his avocation, his endeavor is doomed to failure, as the man engaged in an active practice must of necessity frequently neglect the demands of his students in responding to the cry of his patients. It is a problem which goes back to ancient times and was well expressed by that philosopher of Christianity when he said:

"A man cannot serve two masters, as he will hold to the one and forsake the other."

The problem of how the full-time teacher is to be incorporated into our existing educational system has not yet been solved. The selection of the man is less difficult than how he shall be fitted in after selection. The man himself may well be gauged by the standard expressed by Dean Lewis when he made the statement that a surgeon should be an excellent diagnostician, an expert pathologist, a good physiologist and an expert and sound operator. The ideal situation is where the school is conducted entirely on a university basis with the entire teaching faculty on a full-time status. Close approximation of this ideal is evident in some schools and the productive output from these institutions in respect to quality of students and quality of scientific knowledge will be watched with ever-increasing interest by those interested in our medical educational problems. From the ideal condition all degrees of infiltration of the full-time idea exist, a single man as department head,

a director and a few subordinate instructors, several subordinate instructors and the like. The degree of infiltration of the full-time idea seems to be largely dependent upon the resources of the school, the greater the financial power the greater the prevalence of full-time teachers.

The introduction of the vocational idea into clinical surgery, especially in those schools dependent largely on voluntary assistance aside from the endeavors of the salaried instructors, gives rise to many problems. For instance, shall vocational clinical teachers be allowed the privilege of consultation in the hospital and referred private practice, which does not remove them from the site of their major work? Should the answer be in the negative, it is essential to provide a salary which will enable the full-time man to live and raise his family on a plane corresponding to that adopted by his colleagues in active practice and teaching in their spare time as an avocation. This level but few schools would be able to maintain at the present time. Should the answer be in the affirmative, another problem arises, for the man with sufficient intelligence and training to hold a vocational position will attract referred work because of his ability and also from his former students as they enter practice. This can, and unquestionably does, cause friction between the vocational man and his avocational colleagues in that the latter feel that the former, by their position, are given an unjust advantage.

From the viewpoint of the student the introduction of vocational teaching in clinical surgery or medicine has advantages and, perhaps, some disadvantages. It is to the benefit of the student in that he always knows that the instructor is going to be present, thus eliminating those periods of unrest which arise when gaps occur due to the enforced absence of the avocational instructor. It has been my observation that the vocational teacher consistently and logically plans his courses, rather than lectures or talks extemporaneously from personal experience. On the other hand, some contend that the student loses by not having contact with the practitioner who has years of experience in private practice to enlighten his sayings. The answer to which is, that the development of teaching hospitals and the ever growing tendency for hospitalization of the sick has made the field of experience of the vocational teacher as wide or even wider than that of his colleague in private practice. The training of students, so far as their relationship to the patient is concerned, is entirely carried on in the clinics and wards of our hospitals. Thus, vocational or avocational teachers have equal opportunity to direct the attitude which a student develops toward his patient. Should there be a lack of training in the essentials necessary to handling patients the fault lies in the abandonment of the old apprentice system rather than in the failure of the vocational clinical teacher. Personally, I believe that unless a student has the inherent attributes of a gentleman, which are the ethical fundamentals required in practice, when he arrives at medical school no one is going to be able to instill those qualities into his consciousness during his technical course.

In thus sketching the problem of vocational teaching in surgery, I realize that no new light has been cast on the question, but perhaps the discussion has been opened so that more clever brains may solve the situation.

DISCUSSION (*Abstract*)

Papers of Dr. Moore, Dr. Lemann and Dr. Chaney.

Dr. L. F. Rodriguez Molina, Dean, School of Medicine, Havana, Cuba (Dr. Finlay translating).—Dr. Molina says our School of Medicine in Havana has not been able as yet to make as great and as rapid progress as yours. Our School of Medicine is part of the State University, and we have not the economic autonomy which we would desire to have, to be able to improve as rapidly as we desire in our teaching. The present Government of Cuba is very generous as regards everything in the way of teaching, not only the teaching of medicine but all university teaching, and has promised to help us in different ways. The first step we aim to get, is a full-time professorship for the laboratory branches.

We also lack, on account of this same governmental ownership, the donations which in this great country you receive from private parties, and so we have to depend entirely upon government aid, which we hope will soon increase. We have, however, a number of young men, especially in the different laboratories, who are very enthusiastic and who are perfectly content to do practically (though not officially) full-time work, giving most of their time to the work of teaching and research.

I am in favor of full-time men only for the professorships of anatomy and physiology, and other laboratory branches, but not for the clinical ones, because the clinical professor needs private practice in order to sustain personal contact with the patient.

Dr. C. E. Finlay, Havana, Cuba.—We have had in Havana Dr. Colwell, of the Medical Education Department of the American Medical Association, who, after his visit, sent us a full report with recommendations as to our most urgent needs; later we received a visit from Dr. Pearce, of the Rockefeller Foundation, who also gave us a report with his views and advice. Medical education has always interested me greatly.

About two years ago, I had the honor to form part of a Commission from the Havana Medical School, which, on the invitation of the Rockefeller Foundation,

visited several medical schools in the United States, mostly in the North. I was especially interested in the work of the clinical full-time professors, established in connection with several schools. In some the full-time clinical professor was strongly recommended. In others, the full time professor was allowed, after certain hours, to do some private work, mostly in consultation. In still others he was allowed private work, but the fees had to be turned in to the school or hospital. Of course, I think the ideal is a clinical full-time professor, but the argument that he loses contact with the patient has some weight. I have no personal experience in this matter and can only state what I gained from seeing the working and hearing the opinions of others, who had worked under the different systems. I found some utterly opposed to it and others enthusiastic over it, but most of those who favored it did so with the proviso that the man should have a sufficiently large salary, and that fees for work on well-to-do patients be turned into the school or university.

Dr. Willard C. Rappleye, New Haven, Conn.—Everyone is agreed that the responsibilities of conducting a major clinical department with the problems of the care of patients, teaching, research and administration cannot be carried satisfactorily as an interest secondary to private practice. Opinion is well formulated that the interests of clinical teaching and research can be best served if the heads of the main clinical divisions are on a vocational or university basis. The exact manner of paying such men is not so important, providing the conditions are such as to attract and hold men of superior ability and promise. The important thing is to secure the right men.

No single plan of organization will suit the conditions and personnel of all institutions, and different schemes work satisfactorily in different places. The strictly full-time plan developed more rapidly than the personnel to fill the posts available. One result has been the placing of young men with little clinical experience in posts of large responsibility, but this is only a temporary condition. The opportunities for university work in the clinical divisions have probably drawn a number of men away from the medical sciences, as witnessed by the small number of medically trained persons available for or going into those fields. Many clinical departments are now training men and women for university medicine, and the field of vocational teaching in the main clinical divisions is accepted and will be put into operation more generally as funds become available.

Very few now believe that the entire staff of a clinical department should be on a university basis. Sufficient personnel with proper qualifications and interest is not available, the cost would be very great, and such a plan is not necessary to secure the best type of medical training and productive research. Men in practice have a great deal to contribute to the education of medical students for practice and are particularly helpful in fields of post-graduate work. A faculty can only benefit by the use of able, experienced clinicians who are familiar with the peculiar problems of private practice and the medical needs of the community.

Dr. Stuart Graves, University, Ala.—I believe everybody who has thought about this matter earnestly is practically of the same opinion. If we study the history of medical education we find that the conduct of a large clinical department has developed into a big problem, which demands essentially all of a man's energy and his thought and his time. He must be especially trained for the job. The teaching of medicine has become a profession, and it seems to me that what Dr. Rappleye has referred to as university teaching is bound to come. There are very few real full-time men in the strict sense of the word. I believe the consensus of opinion is that these strictly full-time men do not bring to the students some very valuable things that the vocational teacher does bring.

The profession at large is a little slow to comprehend that there are men in medicine who would rather teach than practise. There are men who are perfectly satisfied to live on a modest income and who are more interested in the pleasures and rewards that come from vocational teaching than from a lucrative practice. In the development of American medicine there have grown up those who are thoroughly interested in vocational teaching *per se;* and who would rather teach on eight or ten thousand dollars a year, which a full-time clinical head ought to get. He ought to be as good a man as the practitioner making twenty thousand dollars. There are vocational teachers who are more interested in a modest income than in making twenty or thirty or forty thousand dollars in practice. More and more young men will go into vocational teaching because they love it.

Dr. L. J. Moorman, Oklahoma City, Okla.—I am a part-time teacher of medicine and am vitally interested in this subject. On the long way down to this meeting I had the rare privilege of reading Dr. John Brown's essay on John Locke and Sydenham. So many things in this are somewhat applicable on this occasion that I feel that I should like to refer to just a few of them. He said of Sydenham, "That prince of practical physicians pointed the way and walked in it; he taught a method and used it." I think that very aptly sums up the duties of a teacher of medicine, especially from the clinical viewpoint. He emphasized the importance of the art of medicine and portrayed Sydenham as an outstanding disciple of the art as related to the science of medicine.

I feel that we must have both full-time and part-time teachers. I think there can be no disagreement among the men present today on that question, after hearing these papers; and certainly it will be a remarkable accomplishment if the schools with both full-time and part-time teachers succeed in receiving, preserving and transmitting the knowledge which has come to us through six thousand years of human endeavor. They have a big task. I think if we successfully prepare medical students to walk the devious paths which a general practitioner must follow, and I believe about 80 per cent of the sick are cared for by practitioners of medicine who are out in the field, we certainly must have on the teaching staff men who practise the art of medicine, as well as the science. The science of medicine, as we all agree, is dependent upon principles fairly well fixed, while the art of medicine is flexible. The art of medicine in the hospital is not the art of medicine in a palatial home, and neither is the art of medicine in the palatial home the art of medicine as practised in the hovel. These different conditions present their own special problems, problems which are not known to the young man who has finished his work in the school and has gone directly to the outpatient department and then to a full-time professorship. So I am inclined to hold to Dr. Lemann's argument, that if we go on to the successful training of men to practice medicine, and, after all, sick people need just what they needed thousands of years ago, we must not forget the art of medicine.

Dr. C. C. Bass, New Orleans, La.—There are some born teachers. There are many who aspire to be teachers who are not only not born teachers, but cannot become successful teachers. Those born teachers, however, will be imminently successful as teachers, whether on a full-time basis or a part-time basis. Many of the best teachers we have had in medicine have received no salaries whatever.

After all, the terms on which a university or medical school is able to engage the services of a good teacher is to a large extent governed by the local condition, and, perhaps, to a still larger extent, the financial resources of the institution. I believe all of us would use more full-time teachers if we had money to pay them. On the other hand, I agree with Dr. Moorman and other speakers that there is no reasonable probability that we shall reach the point any time soon when any medical school can afford or justify dispensing entirely with part-time teachers.

All of the services and time that part-time teachers can give should be used. They should be paid in opportunities, position and in salaries, according to circumstances and financial resources of the institution.

One thing that makes it very desirable for some members of the staffs in the clinical departments is the considerable amount of other time-consuming work that should be done in the department besides the meeting of classes and giving the few scheduled lectures, demonstrations, and so forth. My own experience shows (and I believe most of those who have had similar experience have observed) that these other departmental needs are more likely to be neglected by the busy practitioner, however well he may mean, than by one who has not the pressing demands of private practice.

I do not agree at all with the argument often advanced for part-time teachers against full-time teachers, that there is so much difference between the management of free patients and private patients and that, therefore, only the part-time teacher can keep up with or pass to his students the proper methods of treating private patients. Free patients have the same diseases as private patients, their health and their lives are just as dear to them and they deserve every consideration at the hands of those who accept responsibility for them. The teacher, whether he be full-time or part-time, who sets the example before his students of inferior, inconsiderate or unconscientious treatment of either free or pay patients is a poor teacher, whatever qualifications he may possess otherwise.

Dr. Isidore Cohn, New Orleans, La.—I think the crux of the whole problem is this: whether a man may be called a full-time professor or a part-time man, he should appreciate his obligation to the patient and his obligation to the student. He should transmit that appreciation of obligation to the student and should have the student utilize his appreciation of that obligation. In other words, a man who is simply using his opportunities as a teacher for personal aggrandizement, whether a full-time or a part-time man, is useless; he is dead wood. One of the gentlemen who spoke said that the part-time teacher neglects his teaching in answer to the cry of his private patient. The man who does that is not interested in teaching.

I believe Dr. Chaney also said that a great deal of the real fundamental improvement has been made by full-time men, men who have been subsidized by the state, such men as Billroth. It is my opinion that very few men have contributed more to the development of vascular surgery than Dr. Matas, that few men have done more in the development of our knowledge of surgical pathology, or pathology as we know it, than Dr. William Mayo, or his associate, Dr. Balfour, that few men have done more in the development of the art of medicine than Lord Robert Jones, the man who is said to have taken orthopedics out of the hands of the harness maker. I believe that part-time men should not be treated any longer as fifth wheels on a wagon but given opportunities to develop, and laboratory facilities, so that they can spread the gospel of the good work which is being done in our clinical departments for the benefit of the medical schools with which they are connected.

Dr. Russell H. Oppenheimer, Atlanta, Ga.—We should be just a little careful in applying philosophical dogma to our procedures. When we say "the teacher is born, not made," for example, we stand on rather dangerous ground. I believe that teachers can be developed in any branch by the process of apprenticeship.

Dr. S. Chaille Jamison, New Orleans, La.—It seems to me that we have to grant (and I think I can say this because I am neither an all-time teacher nor, in a sense, a part-time teacher; I am a half-time teacher, adequately paid for it), that if we do not utilize the man in practice we are going to lose a great part of the experience in the medical profession; and certainly we need more experience in teaching, and more in teaching such a subject as medicine than in anything else. It devolves upon the authorities of a school to make the teaching of the men involved in practice reasonably easy. I mean by that, that if the young men in practice are giving two or three hours several times a week, they should get some monetary return; that is, they should not have to make the terrific sacrifice that many of us did in neglecting our patients and getting no return whatever. Certainly the right kind of man is not going to neglect his classes; rather, as Dr. Cohn pointed out, he puts them first. It will not take long to weed out the men who are using their teaching positions merely for advertising themselves. I believe that no school today should be without many full-time men in the clinical departments, but it is difficult to get these men.

There is a difference in handling patients, between handling the ordinary poverty stricken patient we see in big general hospitals and those whom we see in private practice. The ordinary patient admitted to a large general hospital gets a great deal more than the average patient in private practice. These patients get the benefit of every sort of examination. But when a physician gets out in practice and meets a clerk who is getting a hundred and fifty dollars a month and has a family to support, he is meeting a different problem. The patient is not going to take advantage of laboratory procedures, and if the physician suggests it he will lose his patient. It is the middle-class patient that we have to teach the student how to treat. The poverty stricken patient will get the best in the free wards, as

does the wealthy man. It is the middle-class man who needs our thought and attention.

Dr. Wilburt C. Davison, Durham, N. C.—Logically, the full-time teacher may be the ideal. Twenty-five years ago much of the academic teaching in the colleges of this country was by part-time teachers. The same thing was true of the pre-clinical branches in medical schools. However, the complete application of the full-time principle to clinical teaching has difficulties, in addition to those of the greater expense involved. At the present time, the mixed method, with some of the faculty on full time and others on part time, is probably the solution.

Dr. Lemann (closing).—My experience is that the part-time man is a necessity. That does not imply that he is a necessary evil. Being a necessity and not an evil, he should be given recognition and opportunity.

The plea that the treatment of the private patient is different from the treatment of the hospital patient does not mean that we should treat a man differently according to his pocketbook, his social environment, or his intellectual status. There are many problems, as Dr. Jamison indicated, that come up in the handling of a private patient that do not come up in the handling of the hospital patient. In fact, I think we are even now giving the impression to our undergraduates and to our hospital assistants that we cannot get along without very elaborate apparatus and methods, and I think men who are brought up in that environment will more and more have that attitude. But men who are out in practice and who are teaching only part of the time will see problems as they come up with private patients. That has come up very strikingly with the treatment of diabetics. The average hospital has shown that it can very successfully treat the diabetic within its walls, but it often does not teach the patient. The teacher who is also a practitioner has realized more keenly the necessity of showing patients how grams of carbohydrate, protein and fat are translated into terms of grub and how insulin is given.

Dr. Chaney (closing).—I did not mean to imply, when I said the teacher is born and not made, that a person is competent to teach before he has the grease rubbed off him or immediately after birth, but that a man who is a teacher is characteristically a teacher.

I acknowledge my gratitude to Dr. Matas and others, who have done much in advancing surgery to its present plane, but I deliberately left out the names of men who are still living. We hope that American education and American medical men in the future are going to stand foremost. So far as full-time and part-time teachers are concerned, I believe myself that in our American system the time is not ripe for full-time teachers only. The question is, how can the various frictions which unquestionably arise be avoided? I have served myself as a half-time teacher, as a quarter-time teacher, and as a so-called full-time teacher under the Harvard principle; and in each situation in the process of my own development I know frictions have arisen, and the question is how can we wipe out and smooth away those frictions that come in and distort our medical education.

A NEW DEPARTURE IN THE MEDICAL CURRICULUM*

By W. S. LEATHERS, M.D.,†
Nashville, Tenn.

It is difficult to discuss the medical curriculum without reviewing to some extent subject matter which has already been presented in literature on this subject.

Perhaps it will be of interest to refer briefly to the plan which is being used in Vanderbilt Medical School in teaching students preventive medicine and public health. We have endeavored to develop the department so as to provide a demonstration in teaching this subject as a part of the regular medical curriculum. I should state at the outset that very little had been done in Vanderbilt along this line prior to 1925. In reality there was no department nor any person employed regularly to give such instruction. The library was provided with a few books on public health which were mostly old editions. About fifteen lectures were given by men who were competent to undertake the task, but their major interest was not in the field of medical education. Incidentally, I may state that there are perhaps not more than ten medical schools in the United States that are making a consistent effort to give students the right kind of instruction in the preventive aspects of medicine as a part of the regular medical course.

Is it desirable for the medical student to have better training in this phase of medical service? Will such training be of practical value to him as a practitioner? How can instruction in this subject be best given with this objective? These are questions which are pertinent to the subject being considered at this time. We have endeavored to develop and require the type of premedical training which seems best adapted to the needs of those who anticipate studying medicine; we have largely standardized the methods of instruction in anatomy, physiology and other preclinical branches; and likewise the subjects of surgery, medicine and obstetrics are now being taught from a thoroughly sound and practical viewpoint. However, I think it is agreed that this is not true in regard to the training of medical students in the field of preventive medicine. For this reason I wish to stress at this time the need for well organized

*Round Table Discussion, Section on Medical Education, Southern Medical Association, Twenty-Third Annual Meeting, Miami, Florida, November 19-22, 1929.

†Dean, Vanderbilt University Medical School.

departments of preventive medicine and public health in medical schools with all-time personnel in charge. Unless this subject is considered as of sufficient importance to be given a place in the medical curriculum as a major subject, I scarcely see how we can expect students to respect the effort which is necessary to give them the information desired in this important field. There is at present so much new knowledge in the prevention of disease and in public health organization that the teaching of this subject requires the time of one who has had special training and experience.

In Vanderbilt Medical School we have endeavored to develop a well organized Department of Preventive Medicine and Public Health. It has been developed so that about 70 per cent of the work is of a practical nature. We have not deemed it desirable to eliminate entirely instruction by lectures, but this phase of the course has been decreased, and I may state that the lectures given are on subjects of definite interest and value to the student of medicine as a prospective practitioner. There is one point which I wish to emphasize and that is, we have developed this course so that it will parallel as far as possible the methods employed in teaching the clinical subjects. Preventive medicine should be integrated into curative medicine in dealing with patients, and the physician should assume more definite responsibility for the control of disease in the family and the community. Instruction in this subject cannot be left to all members of the medical faculty, but it should be delegated to those whose business it will be to give the students correct information and the proper viewpoint in disease control. It should be done so as to show the interrelation between preventive and curative medicine. If the course is of a didactic nature it will not appeal to the students. It must be given so that the student will be impressed with its value as a part of his daily work as a practitioner.

Some instruction is given at Vanderbilt in the second year and also in the third, but the major course is for fourth-year students. Our plan emphasizes field demonstrations. We also hold class conferences once a month for the purpose of having students present their observations on field work. These have proven of much interest and are quite stimulating to both students and instructors. In the combined clinics the clinical clerk sometimes goes out in the field and makes observations relative to environmental conditions at the home of the patient who is to be discussed in the clinic of the Department of Medicine. This information is presented during the regular clinic hour and may be amplified by a representative of the teaching staff of the Department of Preventive Medicine. Thus is developed a cooperative arrangement between the two departments. The fourth-year medical students spend every Monday afternoon for six months in field work. The class is divided into four groups, each of about twelve or thirteen students, and each group is accompanied by an instructor. In this way we bring the student in contact with the practical operations of public health as it is being carried on in the field.

I think that it is opportune for medical schools to pay more attention to this phase of medical instruction and provide a reasonable budget for the development of a department of preventive medicine and public health. In my opinion, it is only in this way that the subject will be given the emphasis in the medical curriculum that its importance requires.

A NEW DEPARTURE IN THE MEDICAL CURRICULUM*

PRESENTATION OF CLINICAL SUBJECTS AT TULANE

By C. C. Bass, M.D.,†
New Orleans, La.

What I wish to call attention to is another one of those noble experiments in medical education which we hope to be able to undertake in a limited way with the new building which is now under way and will be occupied next session. There has been a great deal of criticism

*Round Table Discussion, Section on Medical Education, Southern Medical Association, Twenty-Third Annual Meeting, Miami, Florida, November 19-22, 1929.

†Dean, Tulane University School of Medicine.

from time to time (and we have all taken part in it, perhaps, in our minds if not more actively) of the fact that much of our medical education is tending rather to unfit our graduates for the job that they are going to have to do. Most of them are going to be practitioners of medicine, and a great many of them get a feeling that they are so dependent upon equipment and aids of different kinds that they are not prepared to go out and practice medicine after they have graduated. The tendency has been to specialize, and over-specialization has been one of the things that has been criticized. We have in hospital practice and also in medical teaching tended to separate things into water-tight compartments. The students are taught by example and by practice that the patient must be sent to one place for one thing to be done and to another for another thing, and, finally, after a sufficient amount of information has been obtained, we arrive at a diagnosis and perhaps start treatment. Even in the more modern or most recently built teaching institutions we see in the out-patient departments (or in most of them) an arrangement by which there is one room in the clinic for taking histories and another room in which physical examinations are made and another in which certain treatments may be carried out and still another in which laboratory examinations may be made. In more recent institutions they are grouped in this way and are very close together and accessible. But even that is not the way it is in a man's actual practice. The patient comes to his office; he takes the symptoms, which are the history; he makes a physical examination and perhaps some laboratory examination and makes a diagnosis, or should attempt to make a diagnosis. Perhaps he sends the patient somewhere else. In our new building we are trying to teach the student by example, which is the best way to teach, all procedures. The new building will be used largely by the senior students. The junior students will spend their time largely in the wards, working with the patients there, and will have limited facilities in the building for carrying out procedures which can not be done in the hospital. But the senior student will have in this building a room that corresponds to a private office. He will have all the facilities that are in the office or should be in the office of a private practitioner. Patients will be assigned to him, and under supervision of the staff he will take the history, make a physical examination and laboratory examination, and arrive at an opinion as to the diagnosis.

We have, in the several different clinical departments also, conference rooms which will be under the control of the department and available at all times, and we hope that a great many of the cases examined will be presented for conferences. These same conference rooms will be used for quiz work.

The building is a rather large one, 90 feet by 240 feet, nine stories high, making it perhaps the largest teaching clinic building yet built in this country. There are three entrances. In one corner we have placed the home of the organized medical profession of the state and city. The Orleans Parish Medical Society and the State Medical Society have offices here and every accommodation that they need.

All the patients will be seen by appointment only, and the number of patients taken will be limited definitely to the number that can be used to advantage, so that every patient seen and handled in this clinic will be a good example to the student who sees him and takes part in his management.

There is a library, with large reading rooms occupying most of the second floor space. The plan is that the students and the members of the staff, all who have headquarters or places in this building, shall have access to all of the medical literature that we can provide. One will be able to consult most of the medical authorities of the present or past on almost any subject or question, through this extensive library.

An illustration (lantern slides shown here) of the department of medicine will serve as an indi-

cation of the general plans and the way the whole thing is intended to work. This department occupies the entire seventh floor. There are twenty-four typical fully equipped examination rooms or student offices for the examination and treatment of patients by senior students under the supervision and guidance of members of the staff. Students will be doing here under guidance practically the same kind of work they will do later in their offices in their private practices.

About one-half of the seventh floor is occupied by these facilities for student work and the care of patients; the other half is devoted to offices (not for patients), laboratories, work rooms and other facilities for the use of the staff, fellows and graduate students of this department. Adequate facilities are provided for research and intensive studies here, such as also are provided in the other departments located in other parts of the building.

Standard equipment for typical examination rooms comprises desk, chairs and stools, dressing room, examination table, small laboratory table (and cabinet above for supplies) for routine microscopic and clinical laboratory examinations, centrifuge, lavatory or sink. Special departments will have special equipment; the department of urology, for instance, will have an irrigator and perhaps some other equipment not to be found in the examination rooms in other departments.

It is planned, also, that each student shall spend a period of time in one department and be transferred to another department and then another, ultimately giving him a period of assignment in each of the important clinical divisions. When a student is transferred from one department to another, he will go through the formality of turning over his patients to his successor in very much the same manner as he would, or should, in private practice.

It is intended that each clinical department shall be more or less complete within itself. Students and faculty will learn by practice and experience to make complete examinations of their patients in any department, with the possible exception of certain very highly specialized departments. We are going somewhat against the tendency in recent years towards highly specialized practice, and plan to teach the student to rely upon his own resources and facilities, so far as possible. Although this is a departure from the present trend in medical practice, we believe it is at least worth a trial.

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EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Twenty-Fourth Annual Meeting
Louisville, Kentucky, "At the Crossroads of the Nation," November 11-14, 1930

THE LOUISVILLE MEETING

One of the best meetings in the history of the Southern Medical Association was in Louisville, Kentucky, in 1920. Now, after a lapse of ten years, the Jefferson County Medical Society, Louisville, is again host to the Southern Medical Association. Louisville is said to be "at the Crossroads of the Nation," accessible to, and easily reached from, all points in the South as well as in the Eastern, Central and Western states. Louisville is a great medical center, having early in the Nation's history taken its place as a seat of medical learning. There have gone out to the South from the medical schools of Louisville, now all merged into the School of Medicine, University of Louisville, perhaps more graduates than from any other medical center.

The program arrangement of the last several previous meetings, which has proved satisfactory to all, will be followed again this year. Tuesday and Wednesday, November 11 and 12, will be general clinical days, the program the first day being made up by members of the Louisville profession and the second day by physicians from outside the host city.

The opening clinics have been particularly well planned by physicians with the best facilities, to bring out the newer methods of diagnosis and therapy. Guests who arrive in time for the first of the Louisville clinics will feel amply repaid for their effort. For the clinics of the second day, the speakers will be brought together from the entire Southern territory, and from more Northern and Western points as well. The strictly clinical plan of presentation of patients and analysis of symptoms will be followed as far as possible. The wealth of clinical material in and near Louisville will furnish a varied background, for elucidation of the essayists' ideas and methods.

The scientific exhibits from year to year have shown increasing variety and merit. The technical exhibits this year are exceedingly full and varied. Careful inspection of their materials will show how faithfully and how quickly the supply houses respond to changing needs of the medical profession, and how frequently they may be leaders in improvement of technical methods.

The formal opening session with the addresses of welcome and response, featuring the address of the President, Dr. Hugh S. Cumming, Surgeon General, U. S. Public Health Service, will be held on Tuesday evening. The last general session will be on Thursday evening, featuring the Oration on Surgery and Oration on Medicine, both presented by men of national reputation.

Wednesday evening has been set aside for alumni reunion dinners. Dinners will be arranged for all the schools having a sufficient number present to justify an individual dinner. The University of Louisville will make this a "home coming" occasion, and expects to have hundreds of former Louisville graduates at its reunion and dinner.

The eighteen sections and conjoint meetings will hold their sessions on Thursday and Friday, meeting as usual in half day sessions. The Na-

tional Malaria Committee and the Southern Association of Anesthetists will meet conjointly with the Southern Medical Association as has been their usual custom, both presenting strong programs. The general session programs and the section programs are unusually strong this year. The section programs reflect the interests, inclinations, and educational needs of their officers, men in active practice throughout the Southern territory. From a scientific point of view, the Louisville meeting will be another outstanding success in the already illustrious history of the Association.

While the Southern Medical Association is strictly a scientific organization and its annual meetings are to stress things scientific, the social features are not omitted. There will be a President's reception and grand ball with Armistice Day setting on Tuesday evening, following the President's reception. There will be other social functions, with special entertainment for the visiting ladies. Louisville has one of the most active local Women's Auxiliaries in the United States, and its members plan to give the visiting ladies a royal good time. Mrs. George A. Hendon is General Chairman for Ladies' Entertainment and Mrs. John K. Freeman is President of the local Auxiliary.

There will be the usual golf tournaments for men and for the ladies and also the trap shooting tournament, there being permanent trophies to be contested for by both these groups.

Reduced round trip railroad rates are in effect from all points in the South as well as from Eastern, Central and Western states. Louisville is a railroad center reached by through sleepers from all parts of the country. A special train, known as the "President's Special," will operate via C. & O. from Washington, D. C., and Richmond, Virginia, leaving both cities Monday afternoon, consolidating at Charlottesville, and arriving at Louisville Tuesday morning. It is anticipated that the physicians and their families from the Eastern territory of the Association will travel with the President on this special train.

Kentucky has splendid hard surfaced roads connecting with main trunk line roads from all states. Much of historic and scenic Kentucky can be seen in motoring.

Louisville has modern hotels and all who wish to attend will be comfortably housed. See page 976 for details regarding hotels.

McDowell Day

An "after Louisville" part of the program, "McDowell Day," will be of interest to hundreds of physicians throughout the South. "McDowell Day" is Saturday, November 15, and will feature the unveiling of a statue of Ephraim McDowell in the Capitol at Frankfort, a program sponsored by the Southern Medical Association and the Kentucky State Medical Association. See page 974 for full details of "McDowell Day."

Louisville has a large and progressive medical profession. Some of the outstanding physicians in the South practice there and there is no question that this active profession will do everything in its power to make the November meeting a success and all who attend happy over having come to Louisville.

Dr. W. Hamilton Long, an ex-President of the local Society, is General Chairman for the Louisville meeting and has associated with him active committees looking after every detail of the meeting. The officers of the local Society are: Dr. Emmet F. Horine, President; Dr. A. R. Bizot, First Vice-President; Dr. Harry A. Davidson, Second Vice-President; Dr. J. C. Bell, Secretary, and Dr. H. C. T. Richmond, Treasurer.

INTRAVENOUS UROGRAPHY

Since Graham and Cole,[1] in 1924, introduced their method of cholecystography, clinical x-ray diagnosis of gall-bladder disease has become almost as accurate as x-ray diagnosis of fracture. Their contribution was, of course, the introduction of a non-toxic radiopaque dye, which, after intravenous injection, is concentrated in the normal gall-bladder. The dyes in use for cholecystography are phenoltetraiodophthalein, and closely similar compounds, containing 60 per cent of iodine, an element of high molecular weight which gives the substance its radiopacity. Since the dye is not well concentrated by a diseased gall-bladder, the density of the shadow obtained in a given time is an index of gall-bladder function.

Iodine is impermeable to the x-ray because of its high molecular weight, but in most of its forms is irritating to the tissues. It is, however, in addition to being the basis of the usual dyes for cholecystography, the basis of the shadow cast by lipiodol, when this substance is injected

1. Graham, E. A.; Cole, W. H.; Copher, G. H.; and Moore, Sherwood: Diseases of the Gall-Bladder and Bile Ducts. Lea & Febiger, Philadelphia, 1928.

into the lungs, uterus or tubes for diagnostic purposes. It is the iodine in the molecule which makes sodium iodide, after injection through the bladder and ureters into the kidney pelves, a suitable medium for pyelography; and iodine again has been made the basis of a new dye for intravenous urography.

It was observed by Rowntree, Osborne, Sutherland, and Scholl,[2] in 1923, that sodium iodide, after intravenous injection, is excreted by the kidney, and that the renal pelves could be outlined radiographically after a considerable quantity of sodium iodide had been given intravenously, as well as after injections of sodium iodide from below. It was, however, in effective concentration, too toxic for routine use. The new iodine compound which has apparently now satisfied the requirements for intravenous urography is uroselectan.

Uroselectan is a pyridine derivative containing 42 per cent of iodine, which was synthesized in Germany by Binz, and used there clinically by von Lichtenberg, Swick, and others.[2] It was then sent to fifteen large urological clinics in America for further study of its properties, and pronouncement of its worth, before it was released for general distribution. From these clinics are now coming favorable reports confirming its usefulness in outlining the kidney pelves, and ureters, and its lack of toxicity. There seem to be no reports of any harmful effects if it is given according to directions, the only reaction after injection under proper technic being a sensation of warmth. Unless it is injected very slowly a severe localized pain may result.

Colby,[3] of Boston, reports that intravenous pyelography with uroselectan is a valuable means of kidney visualization. The drug should not be used indiscriminately, he says, since in kidney failure it might be left too long in the circulation. It is indicated when cystoscopy and pyelography after catheterization are impossible: for example, in ureteral obstruction when the pyelographic solution cannot be injected past the obstruction. It is also valuable for retrograde pyelography, that is, for injection through the ureters, since it is not irritating like sodium iodide.

Its particular usefulness will possibly be found in the diagnosis of urological conditions in childhood. Hyman,[4] of New York, reports that intravenous pyelography is especially valuable for children, since it does away with the necessity of anesthetizing them for pyelograms. In twenty-two patients ranging in ages from six months to twelve years, he found it non-toxic.

Kretschmer,[5] of Chicago, has used it in 85 cases, in which he also reports it to be non-toxic and non-irritating. Congenital anomalies, such as bifid pelvis or horseshoe kidney, were readily demonstrated. The most readable pictures were those of hydronephrosis and hydro-ureter. In cases of unilateral involvement, the side affected stood out in marked contrast to the normal side, more of the dye being retained by the obstructed kidney. Ureteral stone was readily demonstrated. In partial obstruction, the kidney of the affected side was more clearly outlined than the normal, indicating that the dye reached the kidney but was not eliminated. Passage of some of the dye through the ureter was a valuable indication of whether the obstruction was complete or not. The ureters were not readily visualized in the absence of obstruction, or in the presence of normal or hyperactive peristalsis. In cases of tuberculous kidney, Kretschmer considers intravenous urography particularly valuable, because the pictures may be obtained without catheterizing the better kidney.

There are many well tried methods of kidney examination. The urological field has been so thoroughly, and by such capable hands, mapped out, that any innovation in diagnostic procedures must find its level slowly. Intravenous urography is somewhat in the position of a new serum reaction offered for the diagnosis of syphilis. Even if the technic be more convenient and more accurate than the Wassermann, it must establish itself against the enormous weight of statistics already available of many hundreds of thousands of proven diagnoses by the older methods.

Radiology, as has often been said, is a "study of contrasts in density,"[1] and interpretation of radiograms is by no means an exact science. There is reason to believe that with increasing knowledge of the conditions of concentration and excretion of uroselectan, and experience in the interpretation of its shadows, intravenous pyelography will take a leading place in urological diagnosis. Cooperation of urologists and radiologists will be necessary to perfect the art.

It would seem from past successes that iodine

2. Braasch, Walter: Intravenous Pyelography, Editorial, Surg., Gyn. & Obst., 51:421, Sept., 1930.
3. Colby, F. H.: Intravenous Urography. New Eng. Jour. Med., 203:470, Sept. 4, 1930.
4. Hyman, Abraham: Urography in Diagnosis of Urological Diseases of Childhood. Surg., Gyn. & Obst., 51:409, Sept., 1930.
5. Kretschmer, Hermann: Intravenous Urography. Surg., Gyn. & Obst., 51:404, Sept., 1930.

in various synthetic combinations could be sent to almost any part of the body for therapeutic or diagnostic purposes. Phenolsulphonthalein, the dye used in the most popular of kidney function tests, after intravenous injection is excreted rapidly into the urine. Structurally, it bears some relation to phenoltetraiodophthalein, which is excreted from the circulation into the gall-bladder. One would rather have expected a phthalein compound with iodine to be the basis of the drug for intravenous urography. However, a molecule of rather different formula is the iodine carrier in this instance. Why the phenolphthalein-iodine compound goes selectively into the bile, and the iodine-pyridine derivative goes into the urine, is still a physiological secret.

THE DIFFERENTIAL POLYMORPHONUCLEAR COUNT

More than twenty-five years ago, Arneth classified the neutrophilic leucocytes in five groups, according to the number of lobes of the nucleus, thus designating a difference in the age of the cells. In class one, the youngest cells, in which the nucleus was not lobed, were five per cent of the total cells normally; and in the most lobulated, or oldest group, there were about five per cent of the total number again. The majority of the forms were intermediate. In infectious illnesses with a rise in the total number of circulating leucocytes, there are variations in the percentages of the different types of cells, the young forms assuming necessarily a higher proportion. In cases where there is a normal total number of white cells, that is, no apparent leucocytosis, the Arneth count may indicate a strain on the leucocyte-producing, or disease-resisting mechanism of the body, by a high per cent of non-lobulated or young forms. This count was somewhat troublesome to make, and rarely routinely used in laboratories. There have been a number of modifications of it. The most delicate method of studying the reaction of the bone marrow, according to Farley, St. Clair, and Reisinger,[1] of Philadelphia, is this estimation of the number of young polymorphonuclears. They offer a modification of the method of Arneth, based upon a modification of the work of Cook and Ponder, with a technic which seems simple to execute.

They divide the polymorphonuclears into two classes only: those in which the nucleus is, or is not, divided by a fine filament. The mononuclears, the horseshoe nucleii, and those cells in which there are two, three or more lobes connected by a thick line, form one class, the young forms. Those in which there are two, three or more lobes connected only by a fine filament, form the other. The average of the normal number of young forms is 8 per cent, 16 per cent being the upper limit of normal. An increased number of young forms indicates infection and a strain on the bone marrow, in the presence of a normal leucocyte count. The customary Wright stain is all that is necessary for the differentiation of the two types, which may be made in counting one hundred leucocytes in the routine way. The count apparently is not difficult to make. If its value is confirmed by the clinical experience of others, it should be an addition to the routine blood cell examination.

With the recognition of the importance of the type as well as number of red cells in the prognosis of anemias, it is natural that more widespread attention should be paid to the types of circulating neutrophilic leucocytes. There is also necessarily a rebellion against the number of laboratory tests frequently advocated for diagnosis of one case. Additions which require little extra labor or skill of the technician are most welcomed.

1. Farley, D. J.; St. Clair, H.; and Reisinger, J. A.: Normal Filament and Non-Filament Polymorphonuclear Neutrophil Count: Its Practical Value as a Diagnostic Aid. Amer. Jour. Med. Sci., 180:336, Sept., 1930.

Louisville—Where We Meet

McDOWELL DAY

A MOTORCADE TO FRANKFORT AND DANVILLE

The Southern Medical Association and the Kentucky State Medical Association are jointly sponsoring a program to honor one whom every physician in the South should delight to honor, Dr. Ephraim McDowell, of Kentucky, the "Father of Ovariotomy." The late Dr. Lewis S. McMurtry, of Louisville, formerly of Danville, in an address before the American Gynecological Society on the Centennial of McDowell's operation (1909), very aptly said in closing this address: "Pelvic and abdominal surgery began with ovariotomy; ovariotomy began with McDowell." "McDowell Day" will be Saturday, November 15, the day following the last of the

(Left) Bronze statue of Dr. Ephraim McDowell in Statuary Hall at Washington, the sculptor's model of which is to be unveiled at Frankfort on "McDowell Day." (Inset-left) Old home of Dr. Ephraim McDowell at Danville, where the ovariotomy was performed. (Center) The First Ovariotomy, from a painting said to have been made from a description of the operation given by an eye witness. (Inset-right) Dr. Ephraim McDowell. (Right) Monument to Dr. Ephraim McDowell at Danville.

scientific activities of the annual meeting of the Southern Medical Association at Louisville.*

Each state of the Union may have in Statuary Hall in the Capitol Building at Washington statues of two of the state's immortals, and Kentucky chose as one of her immortals that eminent physician and surgeon, Dr. Ephraim McDowell. The sculptor's model of the statue of McDowell at Washington is to be placed in the rotunda of the Capitol of Kentucky at Frankfort, and on "McDowell Day" the Southern Medical Association and the Kentucky State Medical Association will, with appropriate ceremonies, unveil the statue at Frankfort.

Following the unveiling at Frankfort, those attending will proceed to Danville, the home of Dr. McDowell, where a visit will be made to the house where he lived and where in 1809 he did the first ovariotomy ever performed, the operation that immortalized him. The visitors will then proceed to his grave in the public square at Danville, where a wreath will be placed, with appropriate ceremonies, on the monument erected over his grave by the Kentucky State Medical Association and dedicated in May, 1879, during an annual meeting of the State Association at Danville. Never again will physicians of the South have a better opportunity to do honor to one of their confreres to whom honor is due.

The "McDowell Day" pilgrimage, a motorcade, will start from Louisville Saturday morning at about 8:00 o'clock, proceeding without stop to Frankfort. As one reaches the outskirts of Frankfort there comes into view the State Capitol and the Governor's Mansion, and a very striking aerial view of the city and the Kentucky River. The Capitol of Kentucky is one of the most beautiful in this country, both inside and out. One of the finest pieces of sculpture in the world is the bronze statue of Abraham Lincoln in the center of the rotunda of the new State Capitol. The new Capitol is well worth seeing, as is the old Capitol, now the home of the Kentucky Historical Society and containing much of interest. In approaching the old Capitol, one passes over the spot where Kentucky's martyred governor, William Goebel, fell mortally wounded by an assassin's bullet.

Following the unveiling, the guests will have luncheon at Frankfort and the motorcade will

*Of interest in connection with "McDowell Day" will be the address of Dr. Thomas W. Moore, Huntington, West Virginia, entitled "A Tribute to a Southern Physician, Dr. Ephraim McDowell," delivered as his presidential address at the annual meeting of the Southern Medical Association, Miami, Florida, November 19, 1929, and published in the Southern Medical Journal, volume xxiii, pages 1-6 (January, 1930).

proceed, with a stop at the Frankfort Cemetery, where Daniel Boone and other pioneers of Kentucky are buried. Another fine view of Frankfort, the State Capitol and the winding Kentucky River is to be had from the cemetery. Proceeding on, the motorcade goes over hard surfaced roads through the best of the beautiful and famed bluegrass section of Kentucky, through the Boone Tunnel, onto Brooklyn bridge, over the Kentucky River, where the beautiful palisades of the Kentucky River will be seen. Wonderful cliffs and beautiful river scenery delight the eye at this point. The motorcade passes through Shakerstown, once the home of that orderly and industrious society called Shakers; then goes by the Dix River Dam on to Danville.

After concluding the program at Danville and seeing that beautiful little city, the motorcade will proceed to Harrodsburg, where a light lunch and late afternoon tea will be served. At Harrodsburg is the Pioneer Memorial State Park and here there is much of historic interest. Few places offer more of interest to the traveler than Harrodsburg. From Harrodsburg the motorcade will proceed to Louisville, arriving in the late afternoon in time for dinner and to catch the evening trains out.

Those going East over the C. & O. will be dropped at Frankfort, on the return trip, to get the late afternoon train there. Those who will be going South via the Southern, may remain at Danville, taking their train there.

The Association will provide transportation for those who have not their own cars, and is arranging for the noon-day luncheon, the afternoon tea, and all other items of expense, an all-expense trip at a nominal cost.

The unveiling ceremonies at Frankfort and the ceremony at Danville will of themselves make the trip worth while, but those who have never had the privilege will have an opportunity to see some of Kentucky's most historic parts, as well as much of its scenic beauty, making the trip doubly worth while. The "McDowell Day" motorcade will be a trip long remembered by those who are privileged to take it. Physicians and their wives attending the Louisville meeting should plan to be away one day longer to get the thrill and inspiration that will come to all who go on the "McDowell Day" motorcade.

LOUISVILLE HOTELS

If one writes to the hotel of his choice and does not hear within a reasonable time, or that particular hotel has reservations to its capacity, write to Dr. C. W. Dowden, Brown Building, Louisville, Kentucky, who is Chairman of the Committee on Hotels. He and his committee will take great pleasure in seeing that comfortable accommodations are arranged for all who desire to attend the Louisville meeting. In writing, either to the hotel or Dr. Dowden, state the kind and price of accommodations desired, the day the reservation is to become effective, and if possible give the time of day the reservation is to begin.

BROWN HOTEL (General Hotel Headquarters)
Fourth and Broadway
Single room with bath, $3.00-$7.00
Double room with bath, $5.00-$9.00

SEELBACH HOTEL
Fourth and Walnut Streets
Single room with bath, $3.00-$7.00
Single room without bath, $2.50-$3.00
Double room with bath, $5.00-$9.00
Double room without bath, $4.00-$4.50

KENTUCKY HOTEL
Fifth and Walnut Streets
Single room with bath, $3.00-$7.00
Double room with bath, $5.00-$9.00
Double room with bath, twin beds, $6.00-$10.00

HENRY WATTERSON HOTEL
Walnut Street near Fourth
Single room with bath, $2.50-$5.00
Single room without bath, $2.00
Double room with bath, $4.50-$6.00

TYLER HOTEL
Third and Jefferson Streets
Single room with bath, $2.50-$5.00
Double room with bath, $4.00-$8.00

HENRY CLAY HOTEL
Third and Chestnut Streets
Single room with bath, $2.50 up
Single room without bath, $2.00
Double room with bath, $4.00 up
Double room without bath, $3.50

KOSAIR HOTEL
220 East Broadway
Single room with bath, $2.50-$3.50
Single room without bath, $1.50
Double room with bath, $4.00-$6.00

PLAZA HOTEL
409-417 South Fifth Street
Single room with bath, $2.00-$3.50
Single room without bath, $1.50
Double room with bath, $3.50-$5.00
Double room without bath, $2.00-$3.50

KENTON HOTEL
Walnut Street near Fourth
Single room with bath, $2.00-$2.50
Single room without bath, $1.50-$2.00
Double room with bath, $3.00-$4.00
Double room without bath, $2.00-$2.50

CORTLANDT HOTEL
942 South Fourth Street (Apartment Hotel)
Single room with bath, $2.50 up
Single room without bath, $1.50
Double room with bath, $4.00 up
Double room without bath, $2.50

ARGONNE HOTEL
First and Chestnut Streets
Single room with bath, $2.00
Single room without bath, $1.50
Double room with bath, $4.00

LOUISVILLE HOTEL
Sixth and Main Streets
Single room with bath, $2.00 up
Single room without bath, $1.50-$2.50
Double room with bath, $4.00 up
Double room without bath, $2.00-$4.00

VICTORIA HOTEL
Tenth and Broadway
Single room with bath, $2.00-$2.50
Single room without bath, $1.50
Double room with bath, $4.00
Double room without bath, $3.00

HERMITAGE HOTEL
543-545 South Fifth Street
Single room with bath, $2.00 up
Single room without bath, $1.50 up
Double room with bath, $3.00 up
Double room without bath, $2.50 up

BERKELEY HOTEL
664 South Fourth Street
Single room with bath, $2.00-$3.50
Single room without bath, $1.50
Double room with bath, $3.50
Double room without bath, $2.50

CHESTERFIELD APARTMENTS
Fifth and Broadway (men only)
Single room with bath, $2.00
Single room without bath, $1.50
Double room with bath, $3.00
Double room without bath, $2.00

Book Reviews

Burns: Types, Pathology and Management. By George T. Pack, B.S., M.D., Fellow of the Memorial Hospital, New York City; Formerly Professor of Pathology and Lecturer in Minor Surgery, the School of Medicine, University of Alabama; One-Time Instructor in Pharmacology and Toxicology, Yale School of Medicine; One-Time Assistant in Physiology, Ohio State University; Member American Physiological Society; American Association of Pathologists and Bacteriologists, etc.; and A. Hobson Davis, B.S., M.D., Instructor in Pathology, University of Alabama. 364 pages with 60 illustrations. Philadelphia and London: J. B. Lippincott Company, 1930. Cloth, $6.00.

This long-awaited book has arrived and is not a disappointment. Burns constitute the most painful and often the most serious form of accidents; and hence the need of a more comprehensive study of the subject has long been felt. Pack and Davis have approached the task as all surgical problems should be approached: from the standpoint of physiology and pathology first of all and followed by the various forms of therapy with an evaluation of each. The cuts are appropriate and ample and the book is attractively gotten up.

The volume is all that thoroughness and scholarship could make it, and is the most complete monograph extant in this rather neglected field.

Infant Nutrition. A Text-book of Infant Feeding for Students and Practitioners of Medicine. By William McKim Marriott, B.S., M.D., Professor of Pediatrics, Washington University School of Medicine; Physician-in-Chief, St. Louis Children's Hospital, St. Louis 375 pages, illustrated. St. Louis: The C. V. Mosby Company, 1930. Cloth, $5.50.

This volume represents the crystallization of present day belief in a field in which for years there have been wide differences of opinion. Marriott has led in establishing many of the principles of infant nutrition outlined in his book.

Nearly half of the text deals with general considerations of metabolism, normal nutrition, breast and artificial feeding. The remainder discusses chiefly the commoner nutritional diseases of infancy, diarrhea, dysentery, vomiting, rickets, scurvy, and so forth. The contagious diseases of childhood, for example, measles, mumps and diphtheria, do not come within the scope of the volume. There is a chapter on infections associated with nutritional disturbances, rhinopharyngitis, otitis media, mastoiditis, pyelitis, tuberculosis, and congenital syphilis.

Most text-books on pediatric subjects still abound in polypharmacy and recommendation of useless and occasionally harmful drugs. Characteristic of Marriott's attitude is the statement in Chapter XX, "Drugs have relatively little place in the treatment of diarrhea." He recommends very little therapy the worth of which can not be demonstrated by the most critical of present day experimental methods.

The volume is of convenient size, and in large type. It is the best available text-book on infant nutrition.

Hygiene for Nurses. By John Guy, M.D., D.P.H. (Camb.); F.R.F.P. & S. (Glas.); F.R.C.P. (Edin.); Deputy Medical Officer of Health and Tuberculosis Officer, City of Edinburgh, and G. J. I. Linklater, O.B.E., M.D., D.P.H., D.T.M. & H., M.R.C.P. (Edin.). 212 pages. New York: William Wood and Company, 1930. Cloth, $1.75.

This is a brief book, lacking completeness, with some details at variance with the common teachings in this country, especially in the section on the hygiene of babyhood.

The Mycoses of the Spleen. By Alexander George Gibson, M.D., F.R.C.P., Physician to the Radcliffe Infirmary and Reader in Morbid Anatomy in the University of Oxford. 169 pages, illustrated. New York: The Macmillan Company, 1930. Cloth, $4.50.

There is presented the thesis that certain forms of splenomegaly as splenic anemia, Banti's disease and acholuric jaundice are the result of an invasion by mycelia. The first part of the book deals with theoretical aspects; subsequently the practical side is discussed. Not only is the author's own work included, but also the work of M. Nanta, who tends toward the same belief. It is hoped that the above work will offer an incentive for others to attempt experimentation to corroborate the thesis.

Hypertension and Nephritis. By Arthur M. Fishberg, M.D., Adjunct Attending Physician to Mount Sinai and Montefiore Hospitals, New York City. 566 pages, illustrated with 33 engravings and 1 colored plate. Philadelphia: Lea and Febiger, 1930. Cloth, $6.50.

The etiology of hypertension and nephritis is so closely interwoven that the subjects are best discussed together. Fishberg divides his volume into sections upon the pathological physiology of renal function, tests of renal function, albuminuria, edema, uremia, various phases of hypertension, Bright's disease, and the many forms of nephrosis and nephritis. The latter part of the work deals mainly with essential hypertension.

His opinions in regard to disputed points, given in italics after a discussion of his reasons for them, indicate the point of view from which he writes. For example, after discussing the theory of injury to individual functions of the kidney he says: "No matter what the anatomical substratum, there is only one variety of impairment of renal function, namely, that in which the ability to excrete all the urinary constituents is impaired."

After discussing the chemical theories of renal hypertension he concludes: "The net result of the innumerable investigations directed toward the finding of a urinary constituent, the retention of which in the blood produces hypertension, seems clearly to have been a negative one." "Hypertension, like fever, is merely a symptom and not a disease; sometimes hypertension is produced by renal disease, but more often it is not."

The book is well balanced and highly informative.

Southern Medical News

ALABAMA

On October 3 at 2:30 p.m. at the Medical School of the University of Alabama there will be an unveiling of the portrait of Dr. Josiah Clark Nott, founder and first Professor of Surgery in the Medical College of Alabama, 1859 to 1873. Dr. Nott is said to have been the first to suggest the mosquito as the carrier of yellow fever. Dr. Jere Watson, of Anniston, President of the Medical Alumni, will preside over the meeting.

On Saturday, October 4, there will be a meeting of the Northwest District Medical Society, a section of the State Medical Association, at the University Medical School. Dr. G. F. Littlepage, Vice-president of the State Association, will preside.

Dr. Pilar Hernandes Lira, Vera Cruz, Mexico, spent a week in Birmingham recently observing the work of the Health Department, with special reference to hookworm control work in Alabama. Dr. Lira is engaged in similar work in Vera Cruz.

Dr. Marcus Skinner, of Selma, has been appointed Chairman of the City Planning Committee of the Chamber of Commerce of his home city.

Deaths

Dr. Edwin Philip Solomon, Birmingham, died June 23 of cerebral hemorrhage.

Dr. Frank O. Auxford, Quinton, aged 59, died June 1.

Dr. Richard Spencer Nolen, Bessemer, aged 63, died July 13, of prostatitis following obstruction and uremia

Dr. Benjamin R. Rea, Lafayette, aged 66, died May 13.

ARKANSAS

Dr. Leonard R. Ellis, of Hot Springs, was elected Grand Esteemed Loyal Knight of the Benevolent and Protective Order of Elks at the sixty-sixth annual reunion of the Grand Lodge held in Atlantic City, July 9.

Dr. W. E. Matherly, of Little Rock, has moved to Harrison.

Dr. D. K. McMurry, formerly of Alpena Pass, is now practicing in Green Forest.

Dr. J. T. Polk, of Keiser, has moved to Forrest City.

Dr. Porter R. Rodgers, formerly of Little Rock, has recently located in Searcy and will be associated with Dr. A. G. Harrison.

Dr. L. N. Bollmeier, of Malvern, has moved to Mountain Pine.

Mrs. C. W. Garrison, of Little Rock, was one of four Southern women elected to office at the eighth annual session of the Women's Auxiliary to the American Medical Association held in Detroit in June.

Deaths

Dr. Austin L. Bowers, of Keo, aged 54, died June 18, 1930.

Dr. Jeff H. Dickens, Magnolia, aged 54, died May 18 of pernicious anemia.

Dr. Bennett W. Howard, Midland, aged 63, died July 15 at Fort Smith.

Dr. Will W. Philpot, Egger, aged 75, died May 19.

Dr. Edgar J. Rowland, Benton, aged 82, died June 29 of chronic valvular heart disease.

DISTRICT OF COLUMBIA

Under the name of National Institute of Health the old Hygienic Laboratory of the United States Public Health Service is entering a new era of activity and expanded service. It has accepted under the new law a $100,000 gift for basic chemical research from the Chemical Foundation, Inc. For twenty-nine years the Hygienical Laboratory has been writing a record of discoveries in the cure of disease. Now its thirtieth year sees the laboratory authorized to accept fellowship donations which, it is hoped, will make it the leading institution in medical research in the world.

Dr. William J. Mallory has been elected First Vice-President and Dr. Grafton Tyler Brown, Secretary and member of the Council of the American Therapeutic Society for 1930-1931. Dr. Noble P. Barnes continues as Chairman of the Council.

FLORIDA

The regular quarterly meeting of the Florida Dermatological Society was held in Tampa on September 21. Dr. C. A. Andrews, of Tampa, is Chairman of the Society and Dr. J. Frank Wilson, of Jacksonville, is Secretary.

Weekly clinico-pathological conferences have been inaugurated by the Directors of the Divisions of Medicine and Surgery at the Tampa Municipal Hospital. The surgical division conference is held each Monday noon and medical division conference each Thursday noon. Visitors are welcome.

Dr. H. A. McClure, of Chipley, has been appointed District Medical Officer at Tallahassee, assuming his duties about August 1.

Dr. John G. Lester, of Lakeland, returned September 1 after attending clinics in New York and Baltimore.

Dr. Ernest B. Milam, of Jacksonville, President of the Jacksonville Kiwanis Club, attended the National Kiwanis convention in Atlantic City.

Dr. Tom M. Palmer, son of Dr. Henry L. Palmer, of Tallahassee, has recently located in Jacksonville, limiting his work to pediatrics.

Dr. A. M. Steen has recently given up his practice in Palatka and returned to his former home in New Jersey.

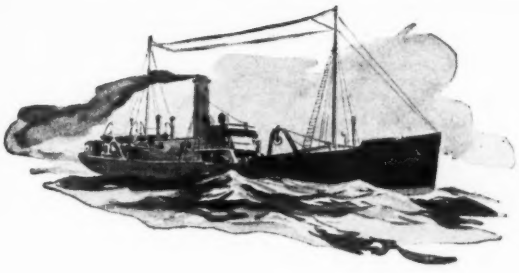
Dr. Harry F. Watts, of Ocala, recently returned from a visit to clinics in New York.

Dr. Lloyd J. Netto, of West Palm Beach, returning recently from Atlantic City where he attended the National Kiwanis convention, visited clinics en route.

Dr. Charles Augustus Clemmer, of Daytona Beach, was married to Mrs. Grace Fowler Newcomb, of Keene, N. H., on July 12.

Dr. J. B. Dowling, of Alliance, was married to Miss Mary Horn, Alliance, on June 20, 1930.

(Continued on page 34)



The Vitamin Yardstick

THE therapeutic position of Cod Liver Oil has been confirmed. There is no synthetic substitute for it.

The therapeutic effect of Cod Liver Oil can be measured by the vitamin potency of the oil administered. In Patch's Flavored Cod Liver Oil the physician is offered a palatable oil of the highest vitamin potency. Each bottle carries the following guarantee:

1,000 A units per gram of oil (3,600 A units per teaspoon dose).

125 D units per gram of oil (450 D units per teaspoon dose).

We secure the double advantage of high potency and unusual palatability by controlling the production of the oil from the fishery to the finished product. The Patch patented cooker assures the extraction of the oil from the livers of fresh cod fish. The Patch experience in the laboratory insures an oil of the highest possible vitamin potency.

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Boston, Mass.

Gentlemen: Please send me a sample of Patch's Flavored Cod Liver Oil and literature.

Dr._____

Address_____

(Continued from page 978)

Dr. Leslie Max Jenkins and Miss Martha L. McDowell, of Miami, were married June 21, 1930.

Deaths

Dr. Helen A. Beadle, Titusville, aged 77, died May 10 of myocarditis.

Dr. Walter Rodman Lincoln, Cocoa, aged 63, died in July of heart disease.

Dr. Lydia Woerner, of Interlachen, died July 3 of apoplexy.

GEORGIA

Dr. James R. McCord, of Atlanta, recently gave a series of lectures before the physicians of Hillsborough and surrounding counties for the Florida State Department of Health in an effort to bring about a reduction in the obstetric death rate.

Dr. Wm. A. Smith announces the opening of his office in the Medical Arts Building, Atlanta.

Dr. Edson W. Glidden, former Superintendent of the State Tuberculosis Sanatorium, Alto, has accepted a position as Superintendent and Medical Director of the Worcester County Sanatorium at Worcester, Mass.

Dr. C. Thompson, Millen, owner and resident manager of the Millen Hospital, entertained the physicians of Jenkins and adjacent counties at dinner July 11. A summary of hospital service for the month of June was read and case records reviewed and discussed.

The Burke County Medical Society met at Midville on July 3 and plans were discussed for an intensive campaign for the eradication of malaria. A thorough system of drainage will be undertaken when funds are available.

The Washington County Medical Society, in co-operation with a number of other organizations, sponsored a conference on malaria at the Court House in Sandersville on August 6. Plans for the meeting were arranged by Dr. O. L. Rogers, Sandersville. The following were present: Dr. G. Y. Moore, President; Dr. Arthur G. Fort, Vice-President; Dr. T. F. Abercrombie, Commissioner of Health; Dr. C. L. Ridley, Macon; and Dr. M. E. Winchester, Director of County Health Work.

Dr. Earl Floyd and Dr. J. L. Pittman announce their association in the practice of urology with offices in the Hurt Building and the Medical Arts Building, Atlanta.

Dr. and Mrs. Steve B. Malone, Sandersville, have returned from an extended tour of Europe. Dr. Malone attended European clinics.

Deaths

Dr. Jack M. Bates, Canton, aged 61, died at his home on June 26.

Dr. Thos. W. Bond, Elberton, aged 55, died June 19 of hemiplegia.

Dr. Edward Thomas Gibbs, Gainesville, aged 48, died at Social Circle, July 2 of heart disease.

Dr. William H. Henderson, Atlanta, aged 49, died on July 22.

Dr. Eugene Lee McCurdy, Stone Mountain, aged 31, died July 28.

Dr. Frederic Wahl, Savannah, aged 65, died on June 28.

KENTUCKY

Mr. Raymond A. Kent, Ph.D., President of the University of Louisville, Louisville, announces the affiliation of the Children's Free Hospital with the School of Medicine. Dr. Philip F. Barbour is Chief of Staff and Dr. John Walker Moore, Dean of the Medical School, is a member of the executive committee, ex-officio.

The annual meeting of the Ken-Ten Public Health Association, composed of county health departments in Western Kentucky and Tennessee, was held July 7-8 at Edgewater Beach on Reelfoot Lake.

Dr. Howard C. Hodge, formerly Superintendent of the Kentucky Baptist Hospital, Louisville, has been appointed Superintendent Decatur and Macon County Hospital, Decatur, Illinois.

The following were elected officers of the McCreary County Medical Society at its last meeting: Dr. A. Bradley, Worley, President; Dr. D. S. Floyd, Yamacraw, Vice-President; Dr. R. M. Smith, Stearns, Secretary; Dr. J. P. Simpson, Auburn, Delegate; and Drs. Smith, Floyd and Simpson, Censors.

Mrs. A. T. McCormick, of Louisville, was one of four Southern women elected to office at the eighth annual session of the Women's Auxiliary to the American Medical Association held in Detroit, June 24.

Dr. Robert P. Ball, University of Louisville, Louisville, received honorable mention for his essay on the goiter problem at the recent annual meeting of the American Association for the Study of Goiter held at Seattle, Washington.

Deaths

Dr. James H. Myers, Whetstone, aged 69, died June 4 of diabetes mellitus.

LOUISIANA

Announcement is made of the postponement of the Fall Clinics in Shreveport until October 21 and 22.

The Shreveport Charity Hospital, Shreveport, has established a special ward for tubercular patients, so announces Dr. E. L. Sanderson, Superintendent.

(Continued on page 36)

Radiograph Before and After Reduction

RADIOGRAPHS have assumed such importance in medical work that a comprehensive x-ray examination is virtually necessary in all bone injury cases, for the protection of the patient and the doctor.

A radiograph made before reduction reveals the type of fracture. Periodic "follow-ups" made during treatment present a definite record of the healing. A radiograph of the healed fracture shows the condition of the bones; it is of most importance from the protective standpoint.

If these radiographic findings are recorded on Eastman *Contrast* Film —*the accepted radiographic film the world over*—there is a definite assurance of the *identical* fine detail and contrast in each. *Contrast* Film is *unfailingly uniform*, so with the same technic it records the exact conditions with every exposure.

Eastman Kodak Company, *Medical Division*
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Gentlemen:

Please send me "Radiography and Clinical Photography," your complimentary periodical devoted to assisting the medical profession in radiographic procedure.

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In Prenatal Care

For the good of both mother and child, a safe diet is needed which provides the elements for body building, especially for sound bone and tooth formation, without impoverishment of the mother's own organism. Essential also is the energy fuel needed to sustain the mother's strength and vitality.

For a food rich in vitamins and minerals . . . . .
For the vital building elements of whole milk, wheat and barley . . . . . .
For a delicious beverage, refreshing to the expectant mother . . . . . .

THE ORIGINAL MALTED MILK

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Samples and literature sent upon request

Horlick's Malted Milk Corp. Racine, Wis.

"A word fitly spoken—how good!"
This word came yesterday from a distinguished M.D.
—"The Storm has been tried and proven."

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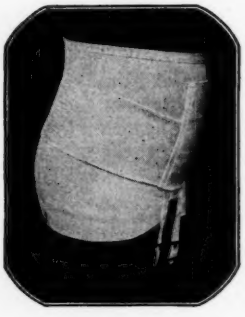


The New "Type N" Storm Supporter

meets demands of present styles in dress.

Long special laced back extension of soft material low on hips.

Hose supporters attached.

Takes Place of Corsets

Adaptable to Pregnancy, Ptosis, Hernia, Obesity, Sacro-Iliac Relaxation, High and Low Operations, etc.

Ask for Literature

Each belt made to order in 24 hours

KATHERINE L. STORM, M.D.

Originator, Owner and Maker

1701 Diamond Street Philadelphia

(Continued from page 34)

The Louisiana State Medical Society gave a dinner in New Orleans, July 12, in honor of Senator Joseph E. Ransdell, author of the bill to establish a National Institute of Health.

Dr. J. O. Dean, Assistant Surgeon, United States Public Health Service, has been relieved from duty at New Orleans and assigned to duty at Ellis Island, New York.

Dr. Laurence R. DeBuys, of New Orleans, was made President-Elect of the American Pediatric Society at the annual meeting in June.

Dr. James E. Knighton, Shreveport, has recently returned from Cincinnati, Ohio, where he has been interne in the Cincinnati General Hospital for the past year. Dr. Knighton will be associated with the Willis-Knighton Clinic at the Tri-State Hospital.

The next annual session of the Medical Library Association will be held at New Orleans.

Dr. John McMullen, Surgeon, United States Public Health Service, has been relieved from duty at New Orleans and assigned to duty in Paris, France, in charge of service activities in Europe.

Deaths

Dr. William H. Ray, Eunice, aged 68, died June 2 of carcinoma of the bladder.

Dr. Warren Wesley Welch, Hall Summit, aged 55, died July 7.

MARYLAND

The Maryland League of Crippled Children, cooperating with the State Department of Health, extended their orthopedic clinic service during July to include the counties of Cecil, Charles, Ken, St. Mary's, Wicomico, Worcester, Allegany, Anne Arundel and Talbott. Since the service was started three years ago thirty-one clinics have been held in nine other counties. So far 738 patients within the age limit from infancy to 21 years have had the service; 639 of these were examined in the clinics of Baltimore hospitals under the league's auspices. Dr. William S. Baer is President of the Maryland League of Crippled Children.

Dr. William F. Rienhoff, Jr., Johns Hopkins University, Baltimore, received the annual award of $300 for the best essay dealing with the goiter problem at the recent meeting of the American Association for the Study of Goiter, held at Seattle, Washington.

The demonstration on diseases and tumors of the bones which was held at the Belvedere Hotel, Baltimore, on Sept. 15-17 will be repeated before the meeting of the Radiological Society of North America in Los Angeles, December 1-5. Admission is free, but attendance is limited to 800.

Dr. Ralph E. Porter, formerly surgeon at the United States Marine Hospital in Baltimore, has been appointed medical officer in charge of the United States Marine Hospital at Pittsburgh.

Dr. Howard C. Knapp, of Baltimore, was married to Miss Annie Marie Buschman on August 9.

Deaths

Dr. Claude E. Grimm, of St. Mary's, aged 44, died at Parkersburg on July 21 of acute diverticulitis and general peritonitis.

Dr. John Wise Hebb, Jr., West Friendship, aged 54, died suddenly May 30.

Dr. Thomas W. Linthicum, Savage, aged 75, died June 16.

Dr. William Christian Sandrock, Baltimore, aged 75, died July 7 of myocarditis.

Dr. Humphrey Wilmer Barbour Rowe, Hillsboro, aged 49, died March 10 of multiple sclerosis and post-operative hemorrhage.

MISSISSIPPI

Dr. R. S. Boykin, Superintendent of the State Charity Hospital, in Jackson, has resigned and will be succeeded by Dr. Willis Walley, a former superintendent of the hospital.

Dr. William Milton Adams has recently located in Booneville and become associated with the Anderson Clinic. Dr. Adams, a graduate of Tulane University, is the son of Dr. R. M. Adams, Ripley.

(Continued on page 38)

NOW COUNCIL ACCEPTED

White's

COD LIVER OIL CONCENTRATE

formerly **COD-LIV-X**

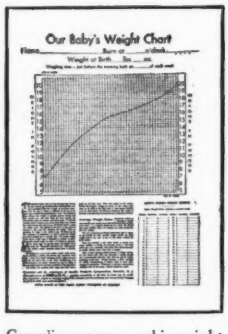
gives you *both* essential Vitamins for infant feeding, A and D, in one palatable wafer, biologically standardized for dosage and potency. Compare for Potency and Accurate Dosage (see Fig. 1), for Biological tests more rigid than that of the U.S.P., (see Fig. 2). Then as a prophylactic against respiratory and other infections, as a nutritional supplement, an anti-rachitic or wherever you would prescribe Cod Liver Oil, test WHITE'S COD LIVER OIL CONCENTRATE—*and again compare.*

1 Each wafer represents not less than 250 vitamin A and 100 vitamin D units. According to N.N.R. a tablet made from C.L.O. Concentrate must contain 200 U.S.P. units per tablet or other dosage unit. Whites C.L.O. Concentrate wafers are 50 units higher than this requirement.

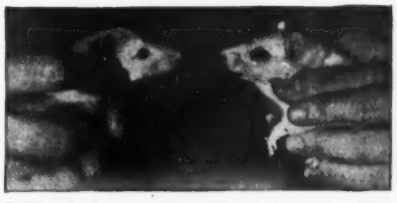
3

Vitamin D potency of each batch tested by that amount of White's C.L.O. Concentrate required to produce a continuous linear deposit of calcium salts on the *metaphyseal cartilage (epiphyseal border of the metaphysis) of the proximal end of the left tibia,* when fed daily for a 10 day period.

4



Complimentary graphic weight gain chart with full instructions for mothers gains their cooperation—affords you definite record of results.



2 Vitamin A potency of each batch determined by the complete healing of xerophthalmia in rats, in addition to the weight gain test required by the U.S.P.-X. Vitamin D potency established by ten day linear calcium deposit test.

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*City & State*_____

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The atmosphere so much desired in all professional offices today . . . manufacturers of quality wood furniture, for reception room, business office and treatment room.

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Sold By All Reliable Dealers

W. D. ALLISON COMPANY
MANUFACTURERS OF
Physicians Office Furniture
INDIANAPOLIS

1131 Burdsal Pk'w'y. **Indianapolis**

(Continued from page 36)

Dr. Robert Heath Foster, Laurel, who has for six years been Chief Surgeon at the South Mississippi Charity Hospital, announces that he will devote his entire time to private practice.

Dr. G. H. Butler, McComb, will succeed Dr. S. L. Hutchinson as Assistant Superintendent of Natchez Charity Hospital. Dr. Hutchinson will engage in private practice.

Drs. Gamble Brothers and Company opened their new clinic building at Greenville about August 1.

Dr. Crit Pharris has recently located in Louisville and becomes associated with Dr. W. W. Parkes.

Dr. Eva E. Strahan is now engaged in general practice with offices in the Marks-Bothberg Building, Meridian.

Dr. Roland H. Cranford, formerly head of the Laurel General Hospital, Laurel, will have charge of the South Mississippi Charity Hospital.

Miss Maud Varcado, R.N., who has for the past twenty years been connected with the South Mississippi Infirmary at Hattiesburg, will succeed Dr. Cranford at the Laurel General Hospital.

Deaths

Dr. John Franklin Aycock, Calhoun City, aged 43, died May 16.

Dr. Joseph Creath Armstrong, Jackson, aged 57, died July 3 of nephritis.

Dr. M. Emmett Britt, Como, aged 76, died July 22.

Dr. Aaron Miller Dodds, Jackson, aged 82, died July 7, of chronic cholecystitis.

Dr. Percy Marmaduke Kimbrough, Morgan City, aged 59, died on July 15.

Dr. Elwood Park Sneed, Lafayette Springs, aged 48, died in June.

Dr. William Cheney Watts, Drew, aged 56, died July 30, of malta fever.

Dr. Heard Hopper West, Gulfport, aged 56, died July 5 of angina pectoris and encephalitis.

(Continued on page 40)

Calcium Deficiency in Infants

"A baby fed on pasteurized milk over a long period receives too little calcium for his growth requirements." (A. L. Daniels & G. Stearns, Journal of Biological Chemistry, Aug. 1924).

Kalak Water is rich in available calcium and can be employed as a drinking water for infants or incorporated in feeding formulas.

KALAK WATER CO.

6 Church Street » » New York City

for the Surgeon and Obstetrician two reliable Squibb Products

Safe Stable Uniform

Pituitary Solution Squibb

Standardized according to the method of the U. S. P. X., hence the physician is always assured of uniform dosage. Pituitary Solution Squibb is safe to use and dependable in its action. It is stable for long periods of time even at room temperature and the physician can feel free to carry this product in his emergency bag so that it will be on hand whenever needed.

Fluidextract Ergot Squibb

For three-quarters of a century Fluidextract Ergot Squibb has been recognized as a reliable and uniformly active product. It is prepared from the highest quality ergot obtainable, after rigid inspection and biological assay of crude material. Careful physiological assay of the finished fluidextract ensures a thoroughly dependable and therapeutically active product.

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MANUFACTURING CHEMISTS TO THE MEDICAL PROFESSION SINCE 1858.

ANESTHETIC GASES and EQUIPMENT

Nitrous Oxide
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Carbon Dioxide and Oxygen Mixtures

REGULATORS
Bedside Stand Inhaling Outfits
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THE "PURITAN MAID TRADE MARK" IN ANESTHETIC GASES AND EQUIPMENT IS THE HALL MARK FOR PURITY OF PRODUCTS AND EFFICIENCY OF SERVICE.

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CHICAGO, ILL. CINCINNATI, OHIO
ST. PAUL, MINN. ST. LOUIS, MO.
BOSTON, MASS. DETROIT, MICH.

(Continued from page 38)

MISSOURI

Dr. Edwin C. Ernst, St. Louis, announces the incorporation of the Radiological Research Institute. Dr. Ernst is President of this new organization. One of its first objectives will be the production of x-ray tubes of a power now unavailable in order that deeper penetration and faster action may be obtained. Other objects of the society are cheaper radium, American control of its own radium supply, establishment of a central radiological research laboratory, fostering pure radiological research in colleges, cooperating with the National Institute of Health created by Congress, and establishment of an advisory board of fifty scientists to extend the practical application of x-ray research to all walks of life. The original members of the institute number nineteen.

The forty-third annual meeting of the Missouri Valley Medical Society will be held in Des Moines, Iowa, in October. Dr. E. H. Skinner, Kansas City, is president-elect.

The new DePaul Hospital, Kingshighway at Wabada Street, St. Louis, was visited by approximately 15,000 persons in the first three days it was opened for inspection. The dedication services were held August 15, culminating more than a century of hospital service in St. Louis by the Daughters of Charity of St. Vincent de Paul. The hospital, from a small beginning of two rooms and a kitchen located at Fourth and Spruce Streets in 1828, has achieved many years of successful service until the new plant now includes a seven-story main building with 350,000 feet of floor space, a five-story infirmary, Sister House for fifty members of the order and a chapel with seating capacity for 350.

Dr. Robert F. Ryland, St. Louis, Chief Surgeon of the St. Louis Public Service Company since 1913, completed twenty years of service July 1.

A fund of $107,000 to be used for an addition to an "orthodox Jewish hospital or orphans' home in St.

(Continued on page 42)

ORGANOTHERAPY

can be effective only through the use of dependable endocrine products. The reputation and integrity of the manufacturer is the physician's only guarantee of reliability of those organotherapeutic products for which there is no chemical or biological assay. Every manufacturing process of all our products is supervised by our Analytical and Research Department.

DESSICATED PITUITARY BODY, U.S.P.
CORPUS LUTEUM
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DRIED SUPRARENALS, U.S.P.
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Insure potency and constancy of action by prescribing the products of

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No Variation

UNIFORMITY and accuracy of formulae are of primary importance in the successful use of Lactic Acid Milk. When Merrell-Soule Powdered Whole Lactic Acid Milk is used, you are assured of these factors even when the milk is prepared by an inexperienced person.

As the largest manufacturer of Powdered Lactic Acid Milk, the Merrell-Soule Co., Inc., employs every facility for scientific control, assuring absolute uniformity of acidity and fat content. Published analyses are strictly adhered to.

Physicians who are recommending Lactic Acid Milk for infant feeding will find Merrell-Soule Powdered Whole Lactic Acid Milk more satisfactory in every respect. It is a cultured milk and thus enjoys the advantages generally believed to be present due to the therapeutic value of the viable organisms themselves. It is more palatable than the ordinary acidified milk. Its powdered form makes for ease and accuracy in preparing the formula.

The Merrell-Soule Co., Inc., also manufactures Powdered Skimmed Lactic Acid Milk.

Literature and samples sent on request.

Merrell-Soule Co., Inc.,
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(Recognizing the importance of scientific control, all contact with the laity is predicated on the policy that KLIM and its allied products be used in infant feeding only according to a physicians formula)

Merrell-Soule Powdered Milk Products, including Klim, Whole Lactic Acid Milk and Protein Milk, are packed to keep indefinitely. Trade packages need no expiration date.

You Can Stop Thumb-Sucking Easily With BABY ALICE Thumb Guard

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Continued Thumb Sucking *causes the teeth to grow irregularly — jaws and mouth to become deformed — elevation of palate, etc.*

The most persistent case of thumb sucking can be corrected with a *Baby Alice* thumb guard. This improved thumb guard allows free use of the hand at all times and does not cause annoyance or discomfort. The child is not subjected to the use of cloths, bitter liquids, etc., which are not only ineffective but insanitary.

Baby Alice thumb guards are made of rust-proof metal and are shaped to fit the thumb and hand comfortably. They can be easily cleaned and sterilized and kept sanitary. Approved by leading baby specialists.

Ask your dealer today for a *Baby Alice* thumb guard. If he cannot supply you write us direct.

Baby Alice thumb guards are made in several sizes for children of different ages. The sizes and ages given in the table below are average:

Size	Age
No. 1	1 - 1½ years
No. 2	1½ - 2½ years
No. 3	2½ - 3½ years
No. 4	3½ - 4½ years
No. 5	4½ - 5½ years
No. 6	5½ - 6½ years

Special guards made to order. Send pencil outline of hand and wrist—with finger indicated, and give the age of child.

McKesson-Bedsole-Colvin-O'Dell, Inc.
Department of Surgical Instruments,
Hospital Supplies, X-Ray Apparatus
1706-1712 First Avenue
BIRMINGHAM, ALABAMA

(Continued from page 40)

Louis or St. Louis County" was provided by the will of Mrs. Pauline Epstein. The will states that the addition is to be known as the "Burenstein Memorial Wing" and six persons are named to constitute a board which will have final choice of beneficiary.

Dr. Kerwin W. Kinard, Kansas City, was installed President of the Association for the Study of Goiter on the occasion of its annual meeting in Seattle, Washington, in July.

The Scott County Medical Society at its meeting in May, held at Benton, elected the following officers for 1930: President, Dr. G. W. H. Presnell, Sikeston; Vice-President, Dr. E. J. Neinstedt, Blodgett; Secretary-Treasurer, Dr. U. P. Haw, Benton.

Dr. and Mrs. R. C. Harris, St. Louis, will return late in the fall from Europe, where Dr. Harris attended clinics in Vienna and Berlin.

Dr. Walter A. German, formerly in charge of the Tuberculosis Section of the Veterans' Bureau in Kansas City, has been appointed to succeed Dr. Geo. C. Lee, resigned, as Superintendent of the Kansas City Tuberculosis Hospital at Leeds.

Mrs. A. B. McGlothlan, St. Joseph, was one of four Southern women elected to office at the eighth annual session of the Women's Auxiliary to the American Medical Association held in Detroit in June.

Dr. Val B. Satterfield, St. Louis, accepted the invitation of Yale University to become a member of the Institute of Human Relations, at New Haven, Connecticut, effective August 1.

Dr. B. F. Carr, Polo, was honored July 13 at a celebration on the completion of fifty years in the practice of medicine. With the exception of five years, all of Dr. Carr's practice has been in Polo.

Dr. Harvey S. McKay, St. Louis, was elected President of the Baltimore and Ohio Railway Surgeons' Association at their recent meeting held in Pittsburgh.

Deaths

Dr. Frank S. Dunham, Kansas City, aged 62, died January 27 of myocarditis and diabetes mellitus.

Dr. Theodore F. Frazer, Commerce, aged 84, died July 5.

Dr. Frederick William Houser, California, aged 76, was killed June 19 when struck by an automobile.

Dr. Alonzo Rouse Kieffer, St. Louis, aged 75, died August 13 of heart disease.

Dr. Alvin K. Musgrove, Bethel, aged 60, died July 11 of locomotor ataxia.

Dr. Benjamin P. Ours, Fulton, aged 75, died April 16 of heart disease.

Dr. James S. Paey, Moberly, aged 69, died June 26.

NORTH CAROLINA

Student nurses at the Duke University School of Nursing, Durham, will have the standing of university students and will receive laboratory and classroom instruction in addition to their practical training. Duke University will grant the degree of Bachelor of Science to women who complete successfully two years of college work—sixty semester hours in addition to the three-year course leading to a diploma of Graduate Nurse.

Dr. Charles O'H. Laughinghouse, Executive Secretary, State Board of Health, reports an increase in the death rate from pellagra. The total number of deaths for the first six months of this year from pellagra was 468 out of 1,442 cases reported. Dr. Laughinghouse estimates that at present there are 20,000 persons in the state suffering from the disease.

The Highsmith Hospital, Fayetteville, announces additions to its staff: Dr. R. A. Allgood, Chief, Department of Obstetrics; and Dr. J. F. Highsmith, Jr., Chief, Department of Traumatic Surgery.

Contract has been awarded for the erection of the Hugh Chatham Memorial Hospital at Elkin, at a cost of $80,000.

Catawba Valley Medical Society, composed of the counties of Lincoln, Catawba, Lenoir and Burke, elected the following officers at its meeting in July: Dr. W. B. Cornwell, Lincolnton, President; Dr. J. L. Rudisill, Lenoir, Secretary; and Dr. W. P. Richardson, Lenoir, Treasurer.

(Continued on page 44)

DRYCO

When Baby Patients are fed on

DRYCO

They are ready for emergencies

FOR

Dryco makes real living cells--flesh

NOT

FAT AND WATER

Dryco babies do not "melt" away!

Build up the infant's resistance to illness by giving him food which his baby stomach can easily digest. DRYCO is flexible, because you can easily regulate the quantity of water to be ingested for a given amount of nutritive elements; proteins, fats and carbohydrates.

Dryco is an ideal transitional food!

PRESCRIBE DRYCO—THE SAFE MILK

Send for clinical data and samples.

Pin this to your Rx blank or letterhead and mail

THE DRY MILK CO., INC.

205 East 42nd St. **New York, N. Y.**

(Continued from page 42)

Dr. H. B. Smith, for several years connected with Watts Hospital at Durham, has located in North Wilkesboro for the practice of medicine.

Dr. L. A. Crowell, Jr., Lincolnton, headed the list of 85 who won their certificates from the North Carolina Board of Medical Examiners at the meeting held in July. Dr. Crowell's father is a recent ex-President of the North Carolina State Medical Society.

Drs. J. R. and J. F. Gamble, Lincolnton, have recently opened their new hospital and clinic.

Dr. James W. O'Dell and Miss Mary Louise Stubbs, both of Dunn, were married June 21.

Dr. Walter Jackson Lackey, Fallston, was married June 27 to Miss Ruth Dixon, of Selby.

Dr. Whitfield Lochinvar Robinson, Mars Hill, was married July 7 to Miss Eula Neal Grove, of Jefferson City, Tenn.

Deaths

Dr. Norval Letcher Coiner, Durham, aged 70, died March 24.

Dr. Charles Augustus Misenheimer, Charlotte, aged 73, died in June of heart disease.

Dr. Victor Emmanuel Weyher, Kinston, aged 84, died July 2.

OKLAHOMA

Dr. W. S. Ivey, Duncan, has returned from Denver, Colorado.

Dr. Hugh Jeter, Oklahoma City, announces the removal of his offices to the Osler Building.

Dr. D. H. O'Donoghue, Oklahoma City, announces the opening of offices in the Medical Arts Building, practice limited to orthopedic surgery and fractures.

Dr. Alfred R. Sugg, Ada, announces the removal of his office to 106 East 13th Street, practice limited to urology and gynecology.

Deaths

Dr. James Abraham Bowling, Alva, aged 73, died June 24 of brain abscess.

Dr. Ernest H. Lain, Lindsay, died July 15 following an operation for cholecystitis.

Dr. Robert S. Miller, Hartshorne, aged 79, died in February of bronchopneumonia.

Dr. George W. Patterson, Wetumka, aged 55, died June 2 of cerebral hemorrhage.

Dr. J. C. Smith, Catoosa, aged 54, died July 20 after several months' illness.

SOUTH CAROLINA

Dr. Kenneth M. Lynch, Charleston, was installed President of the American Society of Clinical Pathologists at its annual meeting in June.

The Doctors' Institute was held recently at State Park under direction of committee headed by Dr. Geo. T. Tyler, Jr., Greenville, and was well attended, thirteen counties being represented.

The Ridge Medical Society at its August meeting, elected the following officers for the next year: Dr. F. G. Asbill, Ridge Spring, President; Dr. Courtland Beeler, Jr., Edgefield, Vice-President; and Dr. W. P. Timmerman, Batesburg, Secretary-Treasurer.

The Seventh District Medical Association met with the Williamsburg Medical Society September 11. Dr. W. G. Gamble, of Kingstree, is President and Dr. C. B. Epps, of Sumter, is Secretary.

Deaths

Dr. James Claude Bonner, State Park, aged 41, died of uremia following a fall in which both patellas and his right arm were broken.

Dr. John Wesley Sandel, New Brookland, aged 76, died June 18.

TENNESSEE

In working out plans for a $3,300,000 municipal improvement program for the City of Memphis, $500,000 has been fixed as the estimated cost of a new general hospital. A bequest of $300,000 for a memorial to the late John Gaston made in the will of the late Mrs. Theresa Gaston Mann will be made available to help defray the cost of the hospital, which will be known as the John Gaston Memorial Hospital.

The East Tennessee Medical Society will meet at Cleveland, October 16-17.

The new Medical Arts Building in Knoxville was opened July 24. At present there are about fifty doctors and dentists in the building.

Dr. Marvin F. Haygood has resigned as Health Officer of Knoxville to accept a position as director of Tuberculosis Control and Superintendent of the State Tuberculosis Sanatorium of the State Board of Health

(Continued on page 46)

EVERY physician reader of this Journal is welcome to a full size tube of this superior Balm for Burns.

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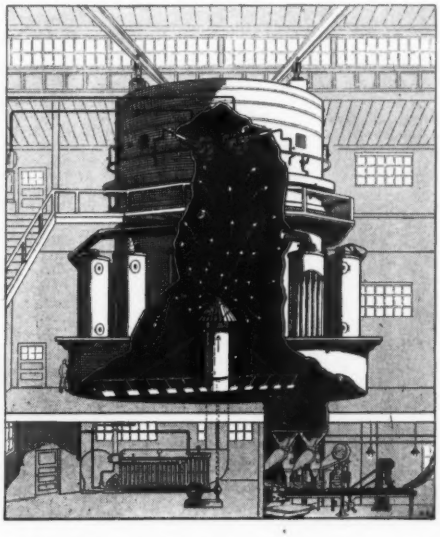

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(Continued from page 44)

of Georgia. Dr. Haygood will be succeeded by Dr. William H. Ennis, Deputy Health Officer since 1928.

Dr. Eugene L. Bishop, Nashville, State Health Commissioner, spent two months this summer on a tour of European countries to study public health administration under the auspices of the Rockefeller Foundation.

Dr. Edward Dunbar Newell, Chattanooga, was recently elected President of the Association of Surgeons of the Southern Railway System.

Dr. George Baker, who has been doing special work in New York for the past two years, has opened offices in the Medical Arts Building, practice limited to pediatrics.

Dr. E. S. Hopper, Alamo, has been elected President of the Dyer, Lake, Crockett Society.

Dr. R. L. Murph, formerly of Yorkville, has opened his office in Milan.

Dr. A. B. Stone, of Nashville, has opened offices in Knoxville.

Deaths

Dr. Wm. Henry Charlesworth, Nashville, aged 65, died July 14 of chronic nephritis and myocarditis.

Dr. Edward Denton, Chattanooga, aged 58, died June 27 of coronary thrombosis and myocarditis.

Dr. Guy Russell Jones, Orlinda, aged 47, died July 2 of heart disease.

Dr. Clarence E. Price, Manchester, aged 73, died in May.

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WANTED—Sweet's apparatus for localizing foreign bodies in the EYE. Quote price to Dr. J. B. D., P. O. Box 716, Daytona Beach, Fla.

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DRUG AND ALCOHOL PATIENTS are humanely and successfully treated in Glenwood Park Sanitarium, Greensboro, N. C.; reprints of articles mailed upon request. Address W. C. Ashworth, M.D., Owner, Greensboro, N. C.

Dr. Claude Chauncy Sullivan, Nashville, aged 63, died June 22 of lobar pneumonia.

Dr. Samuel I. Yarnell, Chattanooga, aged 79, died June 25.

TEXAS

Plans and specifications for the enlargement of the laboratory building of the school of medicine of the University of Texas, Galveston, were approved at the recent session of the Board of Regents, to cost approximately $250,000. In addition to appropriations for the laboratory building $50,000 was allotted towards a new nurses' home building, and $40,000 for equipment and $25,000 for the first year's maintenance of a dental school were approved. The Sealy Smith Foundation is furnishing $350,000 for the nurses' home.

The McLennan County Medical Society is showing moving picture health films in Waco theaters.

Dr. Curtice Rosser, Dallas, was re-elected Secretary of the American Proctologic Society at its recent annual meeting in Buffalo.

Dr. Talma W. Buford, Minter, is doing postgraduate work in neuropsychiatry at the Denver Psychiatric Hospital, Denver, Colorado.

Dr. C. E. High, Wellington, has been doing postgraduate work in eye, ear, nose and throat at Chicago during the summer.

Dr. T. L. Lauderdale has resumed practice at Ranger, following a period of rest and recuperation.

Drs. C. M. Grigsby, Dallas, and T. C. Terrell, Fort Worth, have recently returned from several weeks' postgraduate work in cardiology at the Harvard University Medical School, Boston.

Dr. W. A. Paige, Brownwood, is doing postgraduate work in cardiology at the Harvard University Medical School, Boston.

Drs. H. B. Williford and C. M. Bevans, of Temple, have returned after several weeks' postgraduate work at the Mayo Clinic.

Dr. Howard K. Turner, Dallas, was married June 14 to Miss Charlotte R. Sullivan, of Boston.

Deaths

Dr. I. Z. Brown, Lueders, aged 65, died April 27 of heart failure.

Dr. Burr G. Ward, Marlin, aged 56, died May 7 after an extended illness.

VIRGINIA

The Loudoun Hospital, Leesburg, has obtained a new charter under which the name has been changed to the Loudoun County Hospital, Incorporated. One of the new provisions under which it now operates states that active members of the corporation shall consist of three persons: Judge of the Circuit Court of Loudoun County, the Chairman of the Board of Supervisors and Chairman of the School Board of Loudoun County. Officers and directors for the first year are: T. U. Dudley, President; Dr. H. P. Gibson and Dr. G. F. Simpson, Vice-Presidents; H. C. Littlejohn,

(Continued on page 48)

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(Continued from page 46)

Treasurer, and W. A. Metzger, Secretary. Drs. J. A. Gibson, G. F. Simpson and H. P. Gibson are members of the Board of Directors.

Dr. Emmett H. Terrell, Richmond, was elected Councillor at the annual meeting of the American Proctologic Society held recently in Buffalo.

Dr. Henry Clay Smith, for several years located at Williamson, West Virginia, has recently moved to Boyce.

Dr. L. L. Williams, Jr., Surgeon, United States Public Health Service, has been relieved from duty at Richmond and transferred to Washington, D. C.

The State Departments of Public Health and Public Welfare in Virginia are carrying out a new program of state care for crippled children during 1930. Each department has received from the Legislature a grant of $25,000 for the work. Whenever possible, children are to be treated in their homes through the cooperation of local physicians; the more serious cases will be sent to hospitals as far as the appropriation will permit.

Dr. Henry W. Decker, Richmond, has received appointment to succeed the late Dr. S. B. Moon on the medical staff of the Virginia Home for Incurables.

The Southside Virginia Medical Association held its regular quarterly meeting at Courtland, Sept. 9. Dr. J. A. Grizzard, Drewryville, is President and Dr. R. L. Raiford, Franklin, Secretary.

The Southwestern Virginia Medical Society held its semi-annual meeting in Christiansburg, September 23 and 24. Dr. J. Coleman Motley, of Abingdon, is President and Dr. E. G. Gill, Roanoke, Secretary.

Dr. James K. Hall, Richmond, has been appointed a member for two years and Chairman of the Committee on Ethics and Judiciary of the State Medical Society, to fill the vacancy caused by the death of Dr. Garnett Nelson, of Richmond.

A scientific and clinical meeting was held at the time of the dedication of the Medical Arts Building in Petersburg, September 20, under the auspices of the Post-Graduate Medical Society. Dr. Joel Crawford is President.

Dr. C. W. Trexler, formerly of the University of Virginia, Department of Medicine, is now Medical Superintendent of the Mahelona Memorial Hospital, Kealia, Hawaii. At the recent meeting of the Territorial Medical Association in Honclulu, Dr. Trexler represented the Kanual Medical Society. He and his predecessor, Dr. Forrest J. Pinkerton, were elected Councillors to serve for the next three years.

Mrs. Southgate Leigh, Norfolk, was one of four Southern women elected to office at the eighth annual session of the Women's Auxiliary to the American Medical Association held in Detroit in June.

Dr. Samuel Armistead Anderson, Jr., Richmond, was married to Miss Frances Webster, of Boston, June 16.

Dr. Reuben Foster Simms was married to Miss Annie Sue Pearsall, both of Richmond, on June 14.

Deaths

Dr. Francis Beattie Hutton, Jr., U. S. A. retired, Abingdon, aged 39, died June 29.

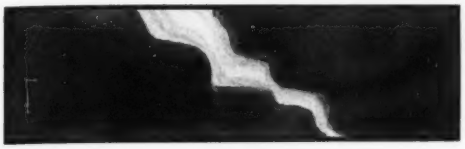
Dr. H. F. Whisler, Grottes, aged 63, died June 14.

WEST VIRGINIA

Plans for the formation of a new component society in Wetzel County have been worked out and will doubtless soon become effective in a working organization. There are approximately twenty practitioners in the county, which would form a strong group. The physicians of Tyler County may possibly join the Wetzel County physicians as members of the new society.

For the first time since its organization, it is planned to hold the quarterly meeting of the Mason County Medical Society outside of Point Pleasant. By holding the meeting somewhere near the Jackson County line, it is thought the physicians of that county may join with Mason County physicians towards the formation of a larger organization.

The Central Tri-State Medical Society held its fall meeting at the Hotel Prichard, in Huntington, on September 18.



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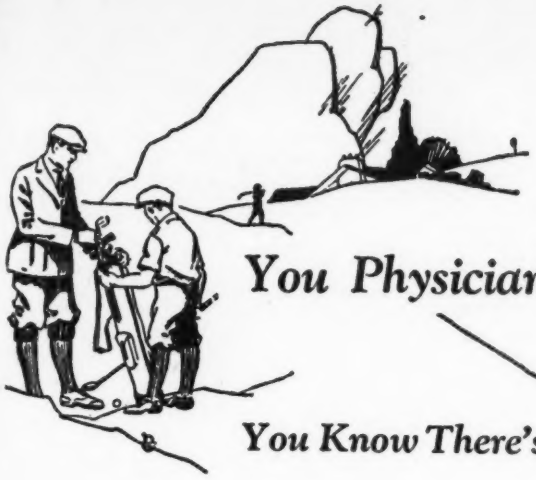

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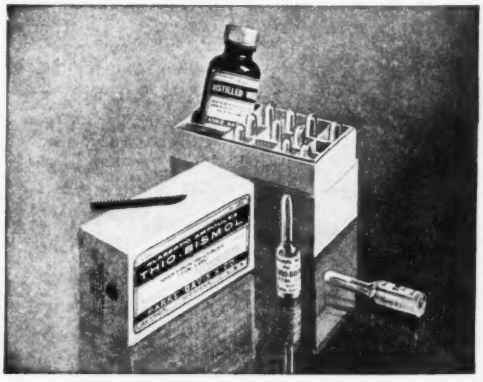

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